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Centre Number						Candidate Number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**J649
B482/01**

APPLIED SCIENCE: DOUBLE AWARD

**UNIT 2: Science for the needs of society
(Foundation Tier)**

**MONDAY 18 JANUARY 2010: Morning
DURATION: 1 hour**

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the Question Paper

A calculator may be used for this paper

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil

Ruler (mm/cm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully and make sure that you know what you have to do before starting your answer.**
- **Answer ALL the questions.**
- **Write your answer to each question in the space provided, however additional paper may be used if necessary.**

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 60.**
- **The marks allocated and the spaces provided are a good indication of the length of answers required.**

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Answer ALL the questions.

1 Tom is an adviser on energy efficiency in the home.

He tells people how they can reduce the energy that is wasted in their homes.

(a) Why would people want to reduce the energy wasted in their homes?

_____ [1]

(b) The statements below show how much heat energy is lost through different parts of an old house.

25% through an uninsulated loft

10% through windows

15% through drafts

35% through uninsulated cavity walls

Which part of the house loses the LEAST heat energy?

_____ [1]

- (c) Tom suggests four methods to reduce the heat loss from the house.

METHOD	COST
draught excluders	low
cavity wall insulation	medium
loft insulation	medium
double glazing windows	very high

- (i) Tom suggests the first thing to do is fit draught excluders.

This is because the draught excluders will cost very little and reduce the heat loss by about 15%.

Why does Tom suggest that double glazing is the LAST thing to do?

_____ [2]

- (ii) Look at the diagram of the old house.

Which method would reduce heat loss the most?

Put a tick (✓) in the correct box.

- draught excluders
- cavity wall insulation
- loft insulation
- double glazing windows

[1]

(d) Look at the diagram of the old house.

Not all the ways that heat is lost from the house are shown on the diagram.

What percentage of heat is lost in other ways?

Show your working.

answer = _____ % [2]

(e) Tom says that we can use less energy in our homes.

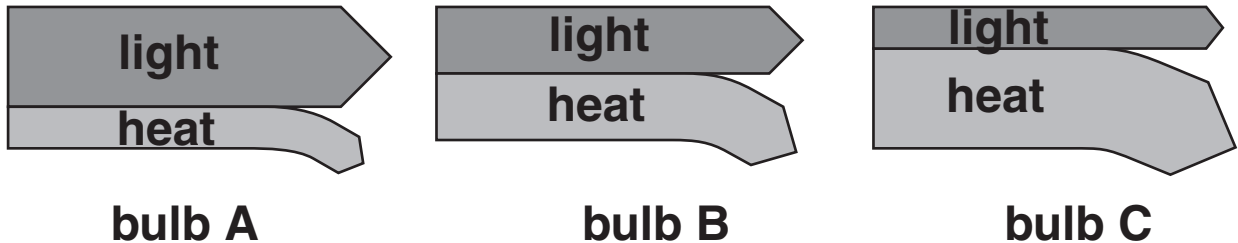
(i) Most of the energy comes into the house as electricity.

Explain why electricity is such a good source of energy for homes.

_____ [1]

- (ii) Tom says the lights in the house use too much energy. He suggests using energy efficient light bulbs.

The Sankey diagrams are for three different types of bulb.



Which bulb A, B or C, is more energy efficient?

_____ [1]

- (iii) Tom says that the energy used by the lights can be reduced by other methods, as well as changing the bulbs.

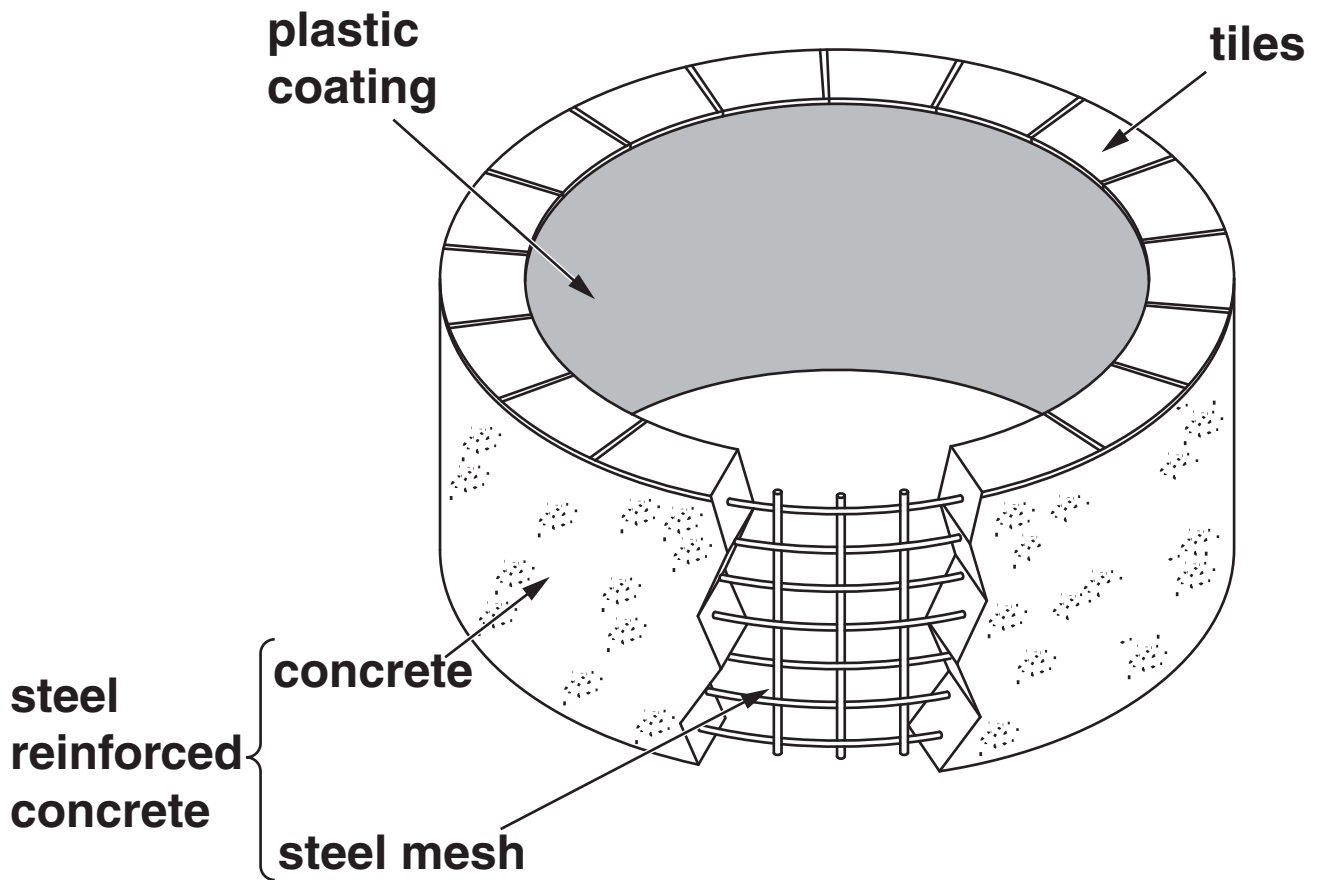
Suggest a different way that energy used by lights can be reduced.

_____ [1]

[Total: 10]

2 Liz is a garden designer.

She makes a diagram of the materials she will need to use to make a raised garden pond.



(a) Different types of material are used to build the pond.

Draw straight lines to connect each MATERIAL with the correct TYPE.

<u>MATERIAL</u>	<u>TYPE</u>
steel mesh	polymer
steel reinforced concrete	metal
tiles	composite
plastic coating	ceramic

[3]

(b) Why does Liz put steel mesh into the concrete?

_____ [1]

- (c) The company that make the plastic coating also make plastics for other uses.

The table opposite shows some information about some of the plastics that they make.

- (i) Non-biodegradable plastics do not rot away.

Write down one problem that non-biodegradable plastics cause.

_____ [1]

- (ii) Plastic B is the best plastic to use to make a pond coating.

Write down the two BEST reasons why.

1. _____

2. _____ [2]

- (iii) The company makes plastic coatings for engines.

The coatings are sprayed onto the engines to stop rusting.

Which plastic, A, B or C, is the BEST choice for making an engine coating?

Explain the most important reasons for your choice.

plastic _____

reasons _____

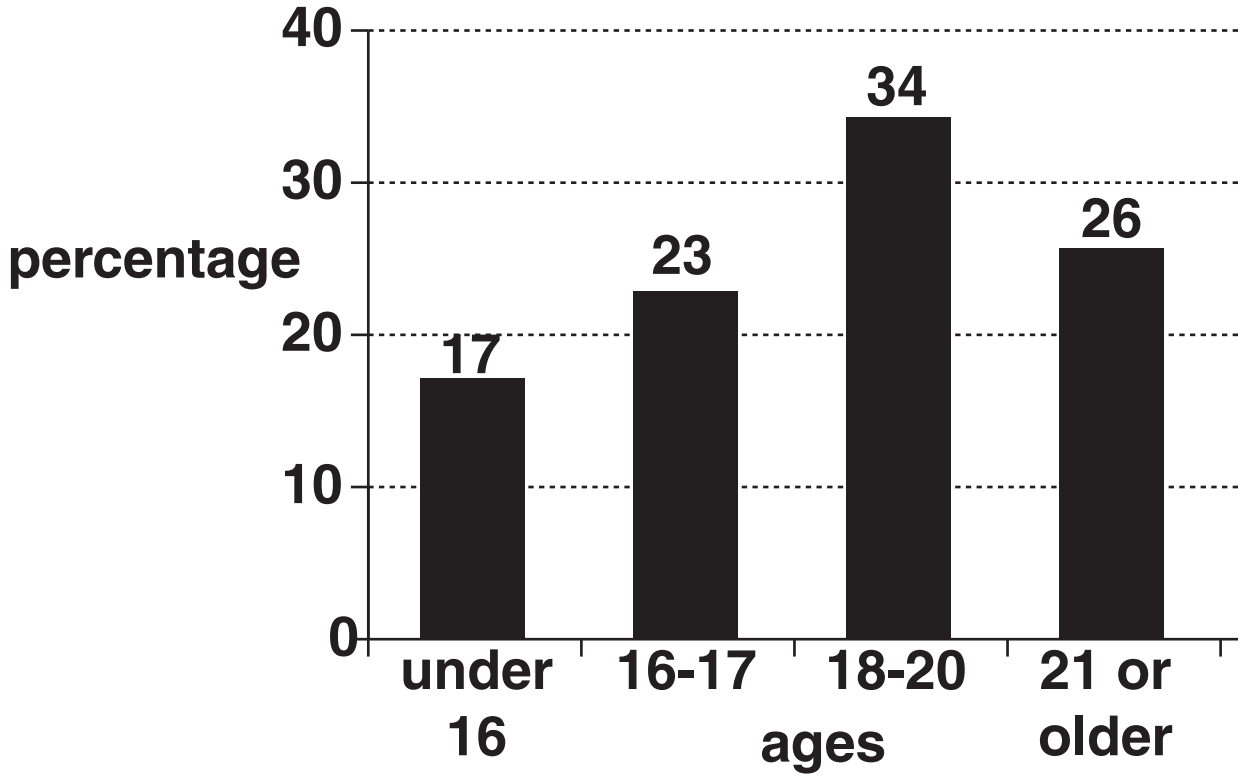
_____ [3]

[Total: 10]

PLASTIC	SOFTENING TEMPERATURE °C	IS IT FLAMMABLE?	BIODEGRADABLE?	OTHER PROPERTIES
A	120	yes	yes	very flexible
B	140	yes	no	not affected by sunlight
C	does not soften at high temperatures	no	no	dark coloured

3 Joe is investigating data about smoking. He finds this graph on a website.

The graph shows how many people smoke cigarettes at different ages.



(a) Which of the following statements about the graph are true and which are false?

Put ticks (✓) in the correct boxes.

	TRUE	FALSE
a higher percentage of people under 16 smoke than over 21	<input type="checkbox"/>	<input type="checkbox"/>
the percentage of people who smoke up to the age of 20 increases	<input type="checkbox"/>	<input type="checkbox"/>
most 17 year olds in the population smoke	<input type="checkbox"/>	<input type="checkbox"/>
17% more people smoke between the ages of 18-20 than under 16s	<input type="checkbox"/>	<input type="checkbox"/>

[3]

(b) Use the graph to work out the percentage of people who do not smoke that are under 16.

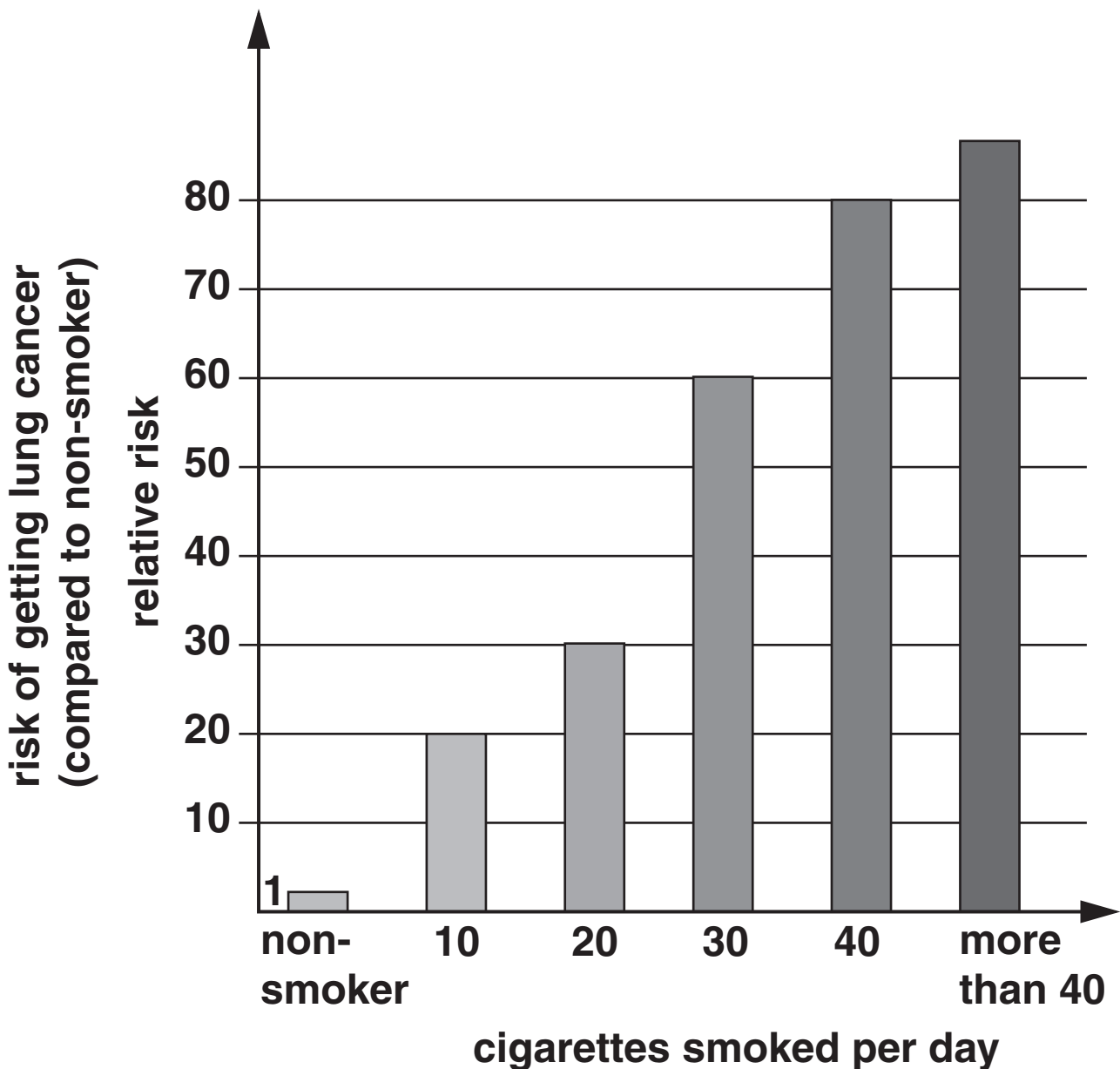
_____ % **[1]**

(c) Joe smokes cigarettes.

He finds this graph on the internet.

The graph shows how smoking cigarettes affects the risk of getting lung cancer.

The risk values are compared to those of a non-smoker.



- (i) Joe calculates that his risk of getting lung cancer is 60 times bigger than if he did not smoke.**

Use the graph to work out how many cigarettes Joe smokes a day.

_____ [1]

- (ii) Joe's friend, Eve, smokes 10 cigarettes a day.**

How much does smoking 10 cigarettes a day increase Eve's chances of getting lung cancer compared to a non-smoker?

_____ [1]

(d) Joe says he thinks smoking is ‘like an infectious disease’.

Which of the following sentences are true for smoking, true for an infectious disease or true for both?

Put a tick (✓) in the correct box on each line.

	true for smoking	true for an infectious disease	true for both
It can cause symptoms of illness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is passed between people by microorganisms.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It can affect the health of people near you.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It causes an addictive chemical to enter the body.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[4]

[Total: 10]

4 Here is a list of substances that are produced from mining raw materials.

iron

limestone (calcium carbonate)

rock salt (contains sodium chloride)

sulfur

(a) Draw straight lines from each SUBSTANCE to the correct FORMULA.

<u>SUBSTANCE</u>	<u>FORMULA</u>
iron	CaCO_3
limestone (calcium carbonate)	Fe
rock salt (sodium chloride)	S
sulfur	NaCl

[3]

(b) Which substance is a non-metal element?

_____ [1]

- (c) The substances are used to make products with different uses.

Draw straight lines from each SUBSTANCE to its USE.

<u>SUBSTANCE</u>	<u>USE</u>
iron	flavouring food
limestone (calcium carbonate)	making cars
rock salt (sodium chloride)	making cement
sulfur	making sulfuric acid

[3]

(d) Some potassium compounds are also mined as raw materials.

These are used to make fertiliser.

(i) What type of production process is used to make fertiliser?

Put a **ring** around the correct answer.

BULK

FINE

INORGANIC

SPECIALITY

[1]

(ii) How are scientists involved in fertiliser production?

Put a tick (✓) in the boxes next to the TWO best answers.

developing new fertilisers

managing money and keeping accounts

controlling the quality of the products

advertising for workers to work in the fertiliser factory

transporting fertiliser

[2]

[Total: 10]

5 Ryan works for a brewery that makes beer.

He manages the fermentation process.

Opposite is a flow diagram of how the beer is made.

(a) (i) Write down TWO stages in the process that will result in enzyme action.

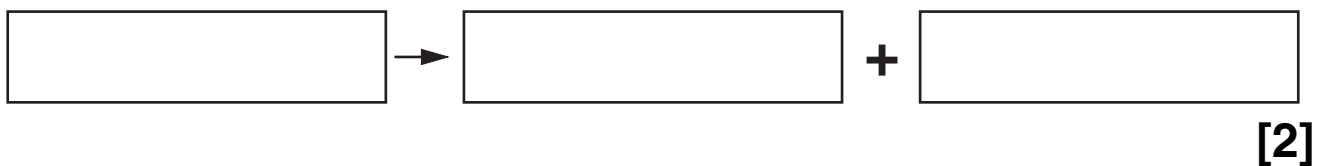
Stage _____

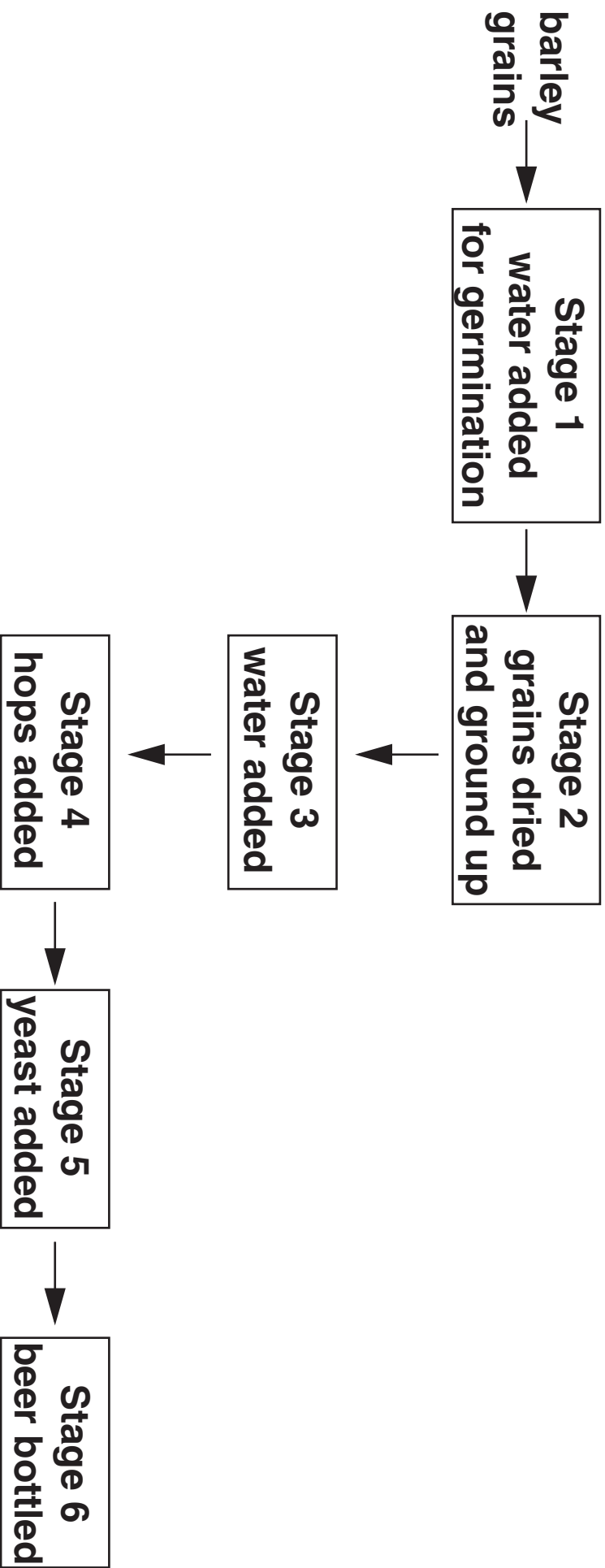
Stage _____ [2]

(ii) At which stage will fermentation take place?

Stage _____ [1]

(b) Write down the WORD equation for fermentation.





- (c) (i) For the fermentation to produce alcohol the yeast must respire ANAEROBICALLY.

What does ANAEROBIC mean?

_____ [1]

- (ii) Yeast can also respire AEROBICALLY.

What are the two products of AEROBIC respiration?

1. _____

2. _____ [2]

- (iii) What conditions are needed for yeast to carry out fermentation?

_____ [2]

- (d) Ryan is thinking of changing jobs.

His knowledge and experience of fermentation will be very useful in the manufacture of many products other than beer.

Suggest two products, other than alcoholic drinks, that are produced by fermentation.

1. _____

2. _____ [2]

[Total: 12]

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TURN OVER FOR QUESTION 6

6 Read the article about methane ice.

METHANE ICE: A CLIMATE SHOCK AHEAD?

Vast amounts of methane gas are trapped on the sea floor. According to scientists, the gas is far more likely to leak than they thought. The methane is trapped in ice crystals in the freezing waters of the deep sea at depths of over 300 m. Under these conditions the methane is kept under high pressure.

However, under some conditions, the methane gas can escape. This can happen if the methane ice is disturbed by Earth movements. The last big leak of methane was 44 000 years ago. The leak affected the climate and led to changes to the land. Scientists are worried the same problems might happen in the near future.

Methane is 10 times more powerful than carbon dioxide as a greenhouse gas. Scientists worry that as sea water warms, the methane could escape.

Hopes that the methane could be used as a fuel to ease the energy crisis have been rejected.

- (a) Suggest TWO reasons why the methane does not bubble to the surface.

[2]

- (b) The methane leak 44 000 years ago affected the climate and led to changes to the land.**

Describe the environmental problems that a large scale methane leak could cause.

[2]

- (c) Methane is both an organic chemical and a fossil fuel.**

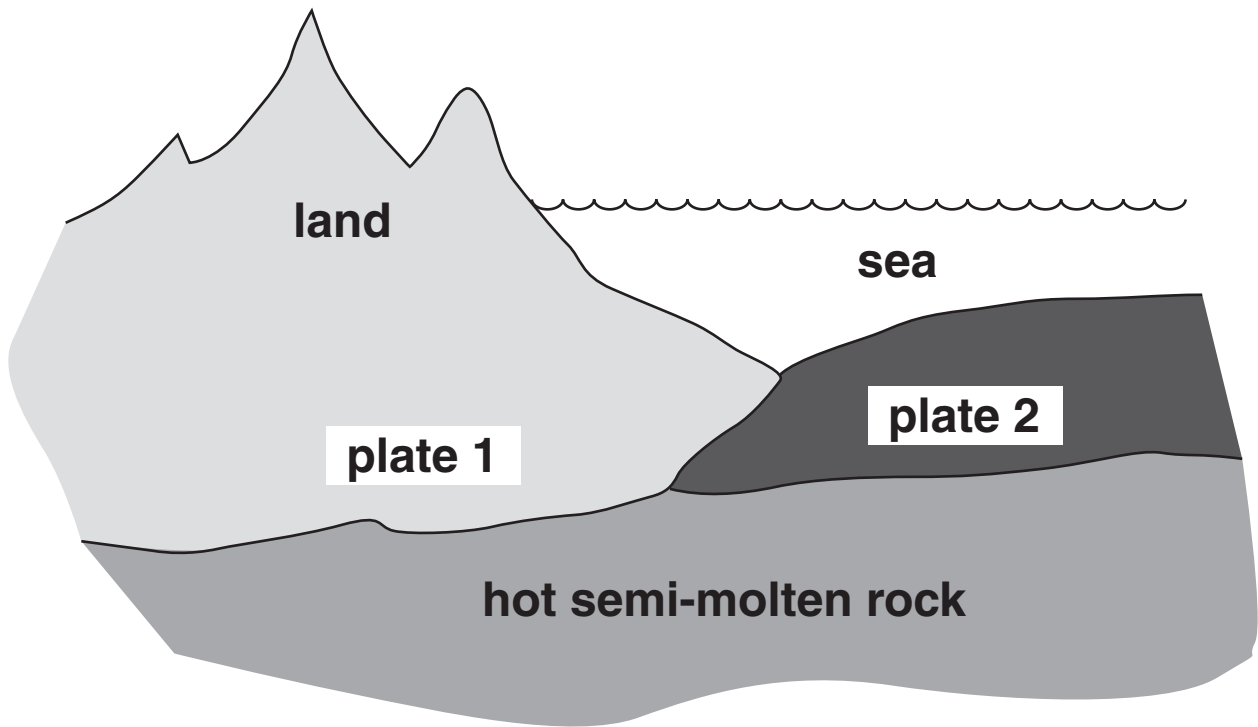
Explain what the terms organic and fossil fuel mean.

organic _____

fossil fuel _____

[2]

(d) Methane ice is NOT found along boundaries between tectonic plates.



Which of the sentences give reasons why methane ice is not found at plate boundaries?

Put a tick (✓) in the boxes next to TWO correct answers.

Plate boundaries move against each other.

Plate boundaries are found along the edges of all continents.

Earthquakes and volcanoes occur in the middle of plates.

The rock around a plate boundary is often hot.

Not all plates are under the sea.

[Total: 8]

END OF QUESTION PAPER

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