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**F**

**GENERAL CERTIFICATE OF SECONDARY EDUCATION** **J649**

# APPLIED SCIENCE: DOUBLE AWARD B482/01

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

*OCE/15273*

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)

**Monday 18 January 2010**
**Morning**

**Duration:** 1 hour

*B482 01*

| Candidate Forename | | Candidate Surname | |
|---|---|---|---|

| Centre Number | | | | | | Candidate Number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- 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.
- Do **not** write in the bar codes.
- 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.
- This document consists of **16** pages. Any blank pages are indicated.

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Answer **all** the questions.

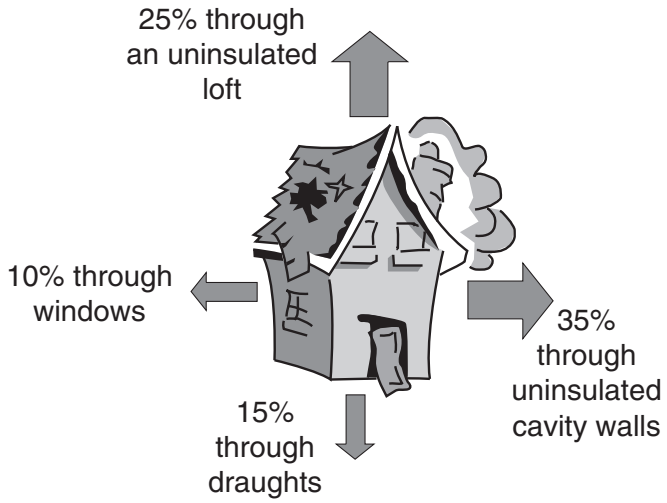
**1** Tom is an adviser on energy efficiency in the home.

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 diagram shows how much heat energy is lost through different parts of an old house.




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]**

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**(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.

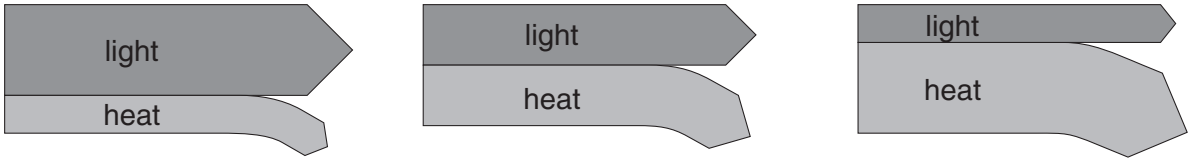
Explain why electricity is such a good source of energy for homes.

.....

..... **[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.




bulb **A** bulb **B** bulb **C**

Which bulb **A**, **B** or **C**, is more energy efficient? ..... **[1]**

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**(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]**

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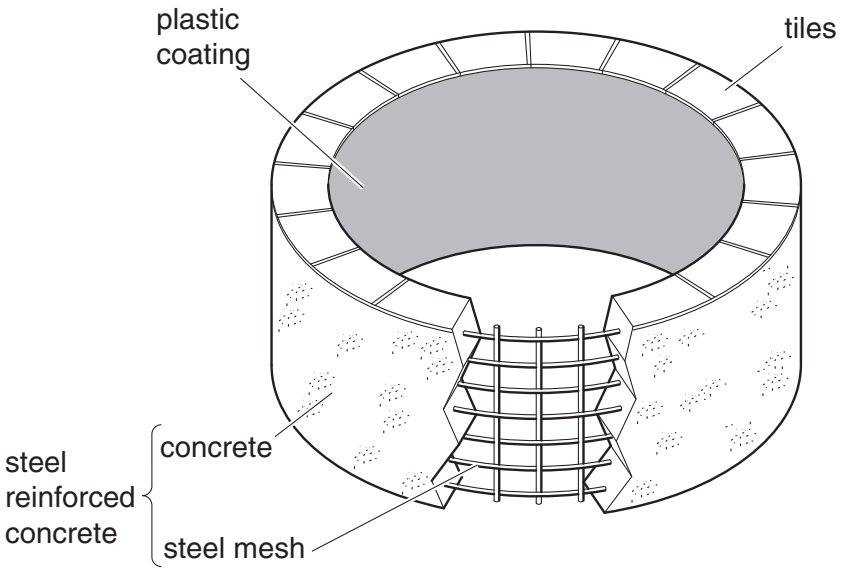
**2** Liz is a garden designer.

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**.

| material | type |
|---|---|
| steel mesh | polymer |
| steel reinforced concrete | metal |
| tiles | composite |
| plastic coating | ceramic |

**[3]**

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

..... **[1]**

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

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

| 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 |

**(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]**

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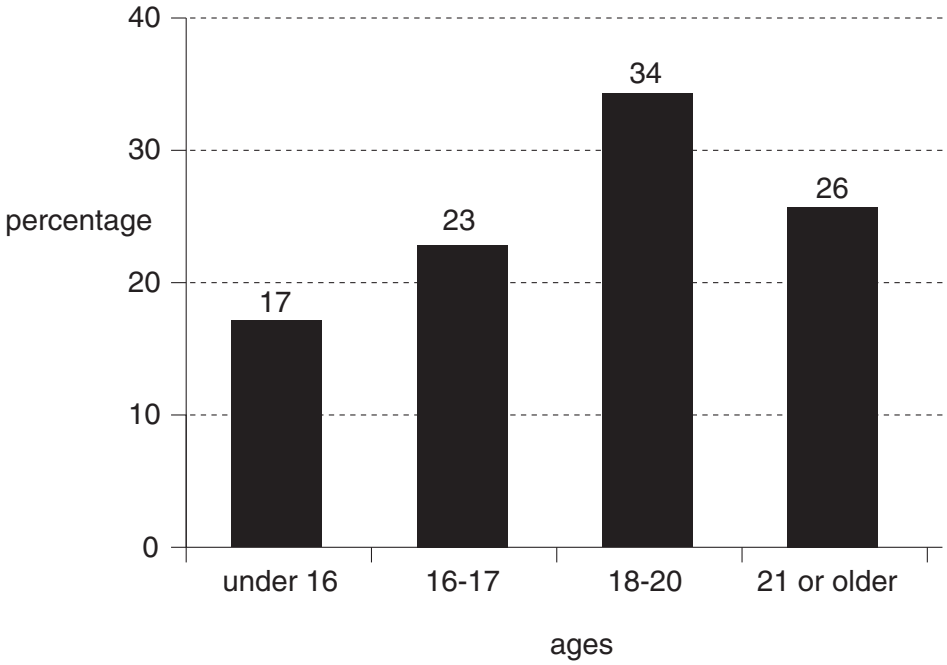
**3** Joe is investigating data about smoking. He finds this graph on a website.

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 | ☐ | ☐ |
| the percentage of people who smoke up to the age of 20 increases | ☐ | ☐ |
| most 17 year olds in the population smoke | ☐ | ☐ |
| 17% more people smoke between the ages of 18-20 than under 16s | ☐ | ☐ |

**[3]**

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

..... % **[1]**

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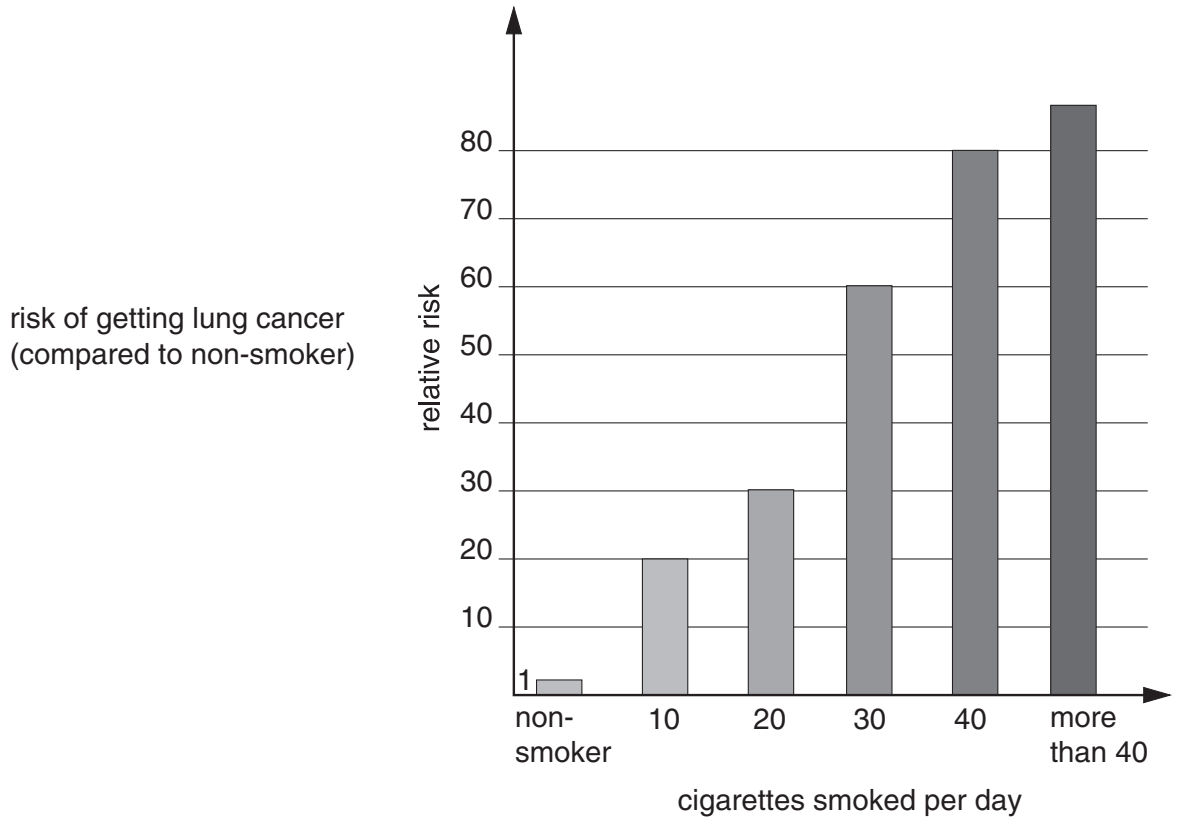
**(c)** Joe smokes cigarettes.

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]**

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**(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. | ☐ | ☐ | ☐ |
| It is passed between people by microorganisms. | ☐ | ☐ | ☐ |
| It can affect the health of people near you. | ☐ | ☐ | ☐ |
| It causes an addictive chemical to enter the body. | ☐ | ☐ | ☐ |

**[4]**

**[Total: 10]**

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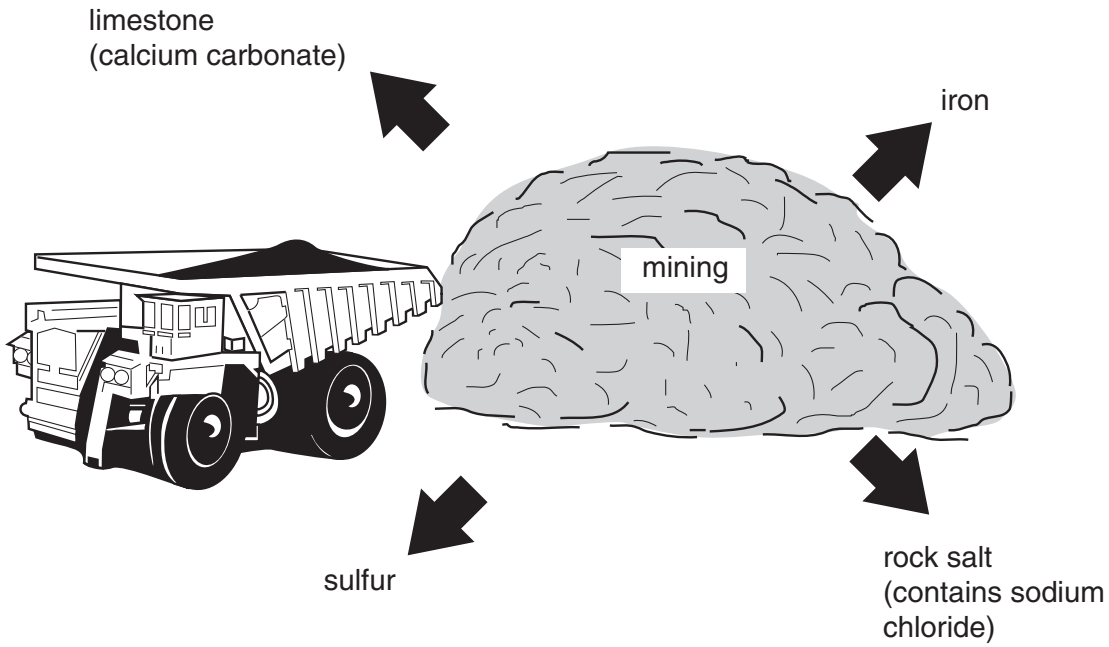
**4** The diagram shows some substances that are produced from mining raw materials.




**(a)** Draw straight lines from each **substance** to the correct **formula**.

| **substance** | **formula** |
|---|---|
| iron | $CaCO_3$ |
| limestone (calcium carbonate) | Fe |
| rock salt (sodium chloride) | S |
| sulfur | NaCl |

**[3]**

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

..... **[1]**

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

Draw straight lines from each **substance** to its **use**.

| substance | use |
|---|---|
| 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]**

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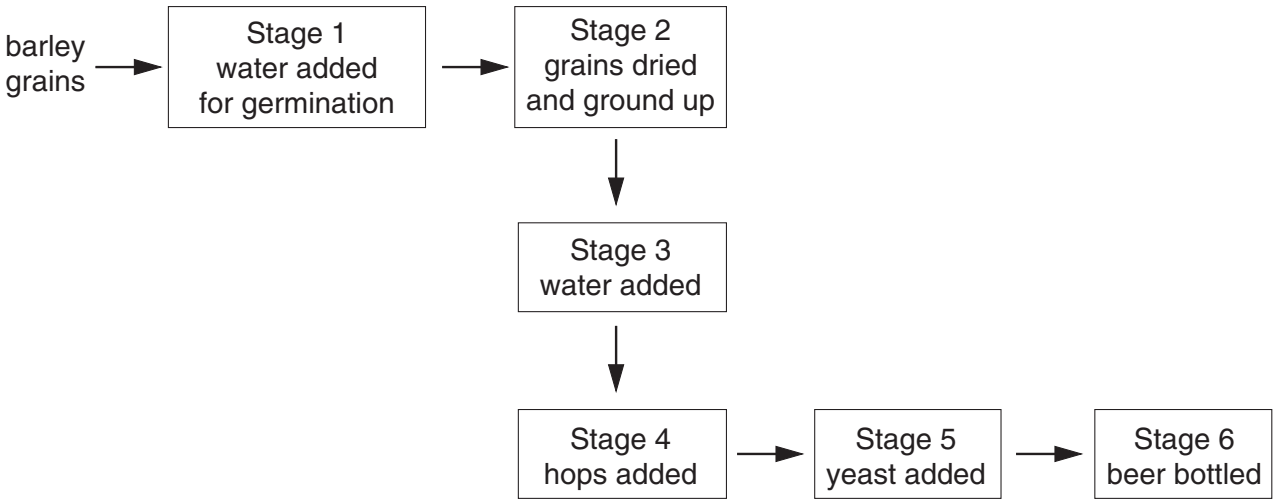
**5** Ryan works for a brewery that makes beer.

He manages the fermentation process.

This 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.

**[2]**

**(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]**

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**(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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**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]**

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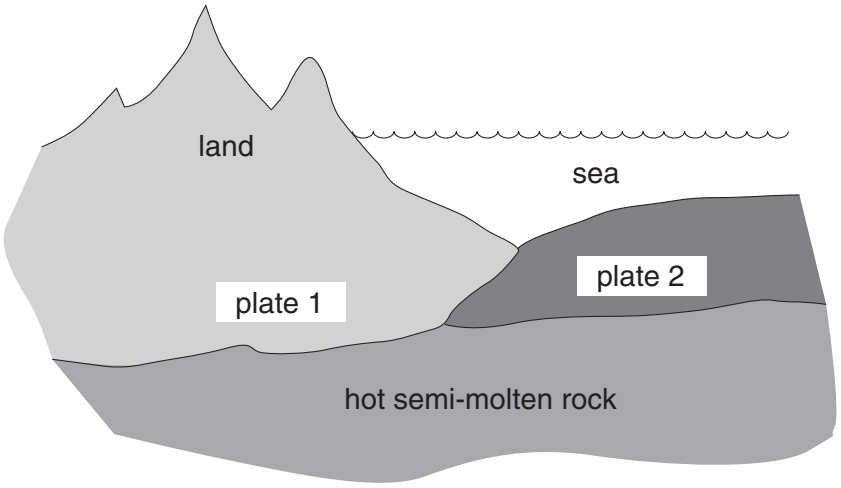
**(d)** Methane ice is **not** found along boundaries between tectonic plates.




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. ☐ **[2]**

**[Total: 8]**

**END OF QUESTION PAPER**

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