C1b (2) QUESTIONS

1. Rapeseed oil can be used for cooking.

A label on a bottle of rapeseed oil stated:

> Rapeseed oil is healthy because it is
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> - low in saturated fat
> - high in poly-unsaturated fat.

Two students investigated if the statement was true. They found the following information about four oils.

	Rapeseed oil	**Sunflower oil**	**Olive oil**	**Corn oil**
Saturated fat (%)	6.6	12.0	14.3	14.4
Mono-unsaturated fat (%)	59.3	20.5	73.0	29.9
Poly-unsaturated fat (%)	29.3	63.3	8.2	51.3
Melting point (°C)	5	-18	-12	-15

(a) Does this information support the two claims made on the label?
Explain your answers.

(i) 'Rapeseed oil is low in saturated fat.'

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(1)

(ii) 'Rapeseed oil is high in poly-unsaturated fat.'

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(1)

(b) Rapeseed oil contains unsaturated fats.

How could the students test the oil to show that it contained unsaturated fats?

Test .....

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Result of test .....

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(2)

(c) Rapeseed oil can be hardened by reacting it with hydrogen.

(i) What would happen to the melting point of rapeseed oil if it was hardened?

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(ii) One student claimed that hardening would make the rapeseed oil healthier.

Explain why the student is wrong.

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(2)

2. Most plastic bags are made from poly(ethene).

Poly(ethene) is a polymer made from ethene.

Ethene is made by cracking saturated hydrocarbons from crude oil.

(a) Use words from the box to complete the sentences about cracking.

alkanes	**alkenes**	**catalyst**	**fuel**	**gas**

Cracking involves heating the ..... to make a vapour.

The vapour is either passed over a hot ..... or mixed with steam and heated to a very high temperature so that thermal decomposition reactions happen.

(2)

(b) Poly(ethene) molecules are made from ethene molecules by a polymerisation reaction.

Describe what happens in a polymerisation reaction.

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(2)

(c) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where apropriate.*

There are millions of plastic bags in use. After use most of these plastic bags are buried in landfill sites. The amount sent to landfill could be reduced if the plastic bags:

- could be reused
- could be recycled by melting and making into new plastic products
- could be burned to release energy

Use the information above and your knowledge and understanding to give the positive and negative environmental impacts of using these methods to reduce the amount of plastic bags sent to landfill.

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(6)

(Total 10 marks)

3. (a) Apart from water vapour, two gases account for about 99% of the present atmosphere of our planet.

What are the names of these gases?

..... and .....

(1)

(b) Scientists now have evidence that, over three billion years ago, our planet's atmosphere was mostly a mixture of water vapour, carbon dioxide, methane and ammonia. Since then the mixture has gradually changed.

(i) Suggest why there is now less water vapour in the atmosphere.

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(2)

(ii) Suggest why there is now less carbon dioxide in the atmosphere.

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(2)

(c) The following information suggests that the continents of Africa and South America were once joined together but then began to move apart.

Fossilised remains of a large fern-like plant called Glossopteris have been found in the rocks of the Carboniferous period in both Africa and South America.

Fossilised remains of a freshwater reptile called Mesosaurus have been found in the rocks of the Permian period in both Africa and South America.

No fossils of identical organisms have been found in the rocks of the Jurassic or the Cretaceous period in Africa or South America.

The following table gives the names of some of the periods in our planet's geological history.

Start of the period millions of years ago	**Name of the period**
2	Quaternary
65	Tertiary
136	Cretaceous

190	Jurassic
225	Triassic
280	Permian
345	Carboniferous
395	Devonian
435	Silurian
500	Ordovician
570	Cambrian

(i) Use this information to suggest when Africa and South America began to move apart.

About ..... million years ago.

(1)

(ii) What conditions were necessary for Africa and South America to move apart?

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(3)

(Total 9 marks)

4. There has been research into fuels for car engines.

Fuel	**Content**	**Melting point in °C**	**Flashpoint in °C**	**Energy released in MJ per litre**
Ethanol	C_2H_5OH	−114	+14	21.2
Diesel	hydrocarbons	About −24	+64	38.6
Petrol	hydrocarbons	About −57	−45	34.8
Rapeseed oil	fats	About +5	+130	32.8

The flashpoint is the lowest temperature a fuel vapour ignites in air.

(a) The melting point of ethanol is precise but the other melting points are approximate.

Suggest why.

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(2)

(b) Ethanol is produced by fermentation of sugar cane. Rapeseed oil is produced by pressing rapeseeds. Waste plant material from both processes is used to feed animals.

(i) Describe how the process of fermentation is done.

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(2)

(ii) Carbon neutral fuels do **not** increase the amount of carbon dioxide in the atmosphere.

Suggest why using a biofuel, such as ethanol or rapeseed oil, is thought to be carbon neutral.

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(2)

(c) When any fuel from the table is used in a car engine, the exhaust gases contain nitrogen oxides.

Explain why.

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(2)

(d) Evaluate replacing petrol with ethanol as a fuel for cars.

To gain full marks you should give a justified conclusion.

Use the information from the table and your knowledge to answer this question.

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(4)
(Total 12 marks)

5. There are different theories about how mountain ranges formed on the surface of the Earth.

(a) (i) Suggest **one** reason why there are different theories.

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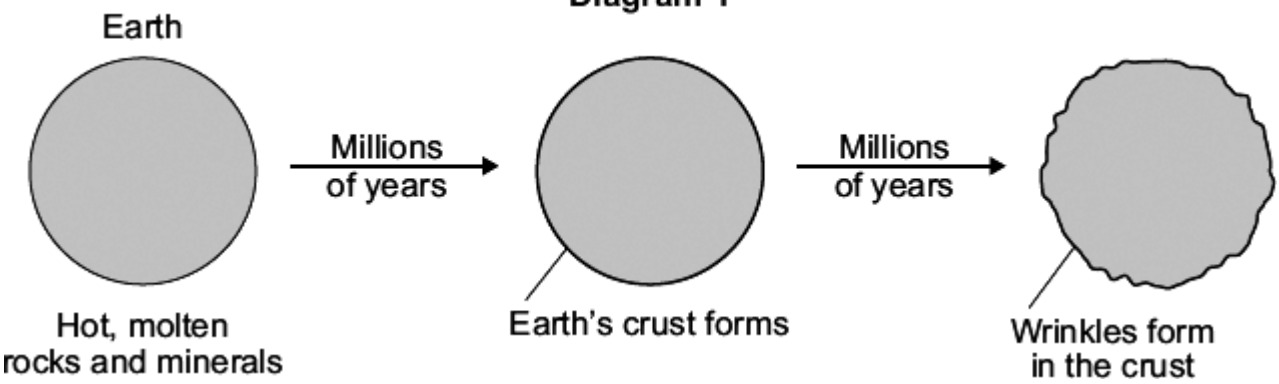
(1)

(ii) **Diagram 1** represents an early theory of how mountain ranges may have formed.

Diagram 1



Use **Diagram 1** to suggest how mountain ranges may have formed.

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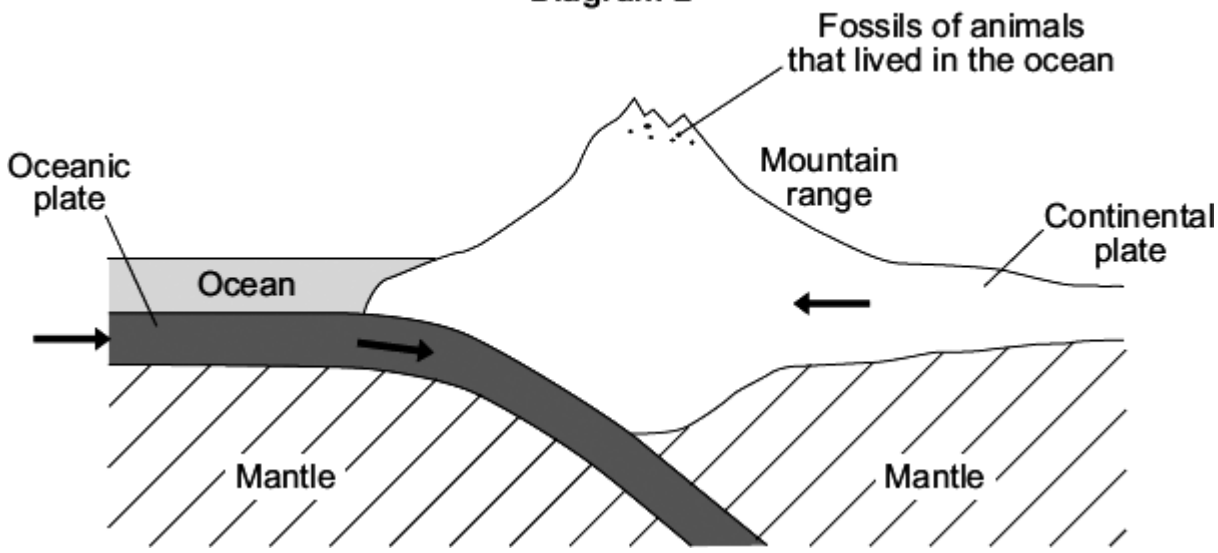
(2)

(b) **Diagram 2** represents a more recent theory of how mountain ranges may have formed.

Diagram 2



(i) The Earth's crust and the upper part of the mantle are cracked into a number of very large pieces called tectonic plates.

Explain how these tectonic plates are able to move.

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(ii) Use **Diagram 2** to suggest how mountain ranges may have formed.

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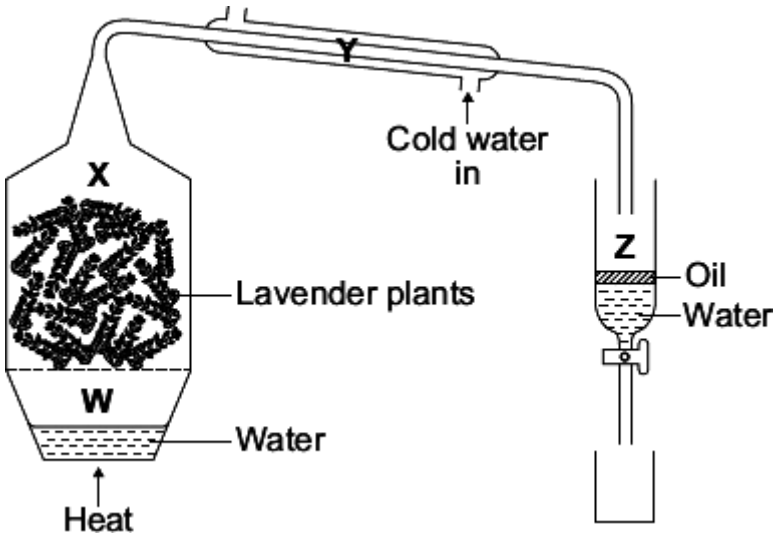
(2)
(Total 8 marks)

6. This question is about plant oils.

(a) Steam distillation is used to separate oils from plants.

The diagram shows some apparatus that can be used to separate oil from lavender plants.
Four parts of the apparatus are labelled **W**, **X**, **Y** and **Z.**



Describe how lavender oil is separated from the plant material.

You need to describe what happens in each of the parts, **W**, **X**, **Y** and **Z**, of the apparatus.

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(b) Olive oil can be used in the manufacture of margarine.
Olive oil has a melting point of – 6 °C and contains about 11% saturated fat and 89% unsaturated fat.

(i) Describe a test to show that olive oil contains unsaturated compounds.

Give the result of the test.

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(2)

(ii) To make margarine from olive oil the percentage of unsaturated fat needs to be decreased.

Give **one** reason why.

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(1)

(iii) Describe how to decrease the percentage of unsaturated fat in olive oil.

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(3)

(Total 10 marks)