Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

B621/01

GATEWAY SCIENCE

SCIENCE B

Unit 1 Modules B1 C1 P1 (Foundation Tier)

FRIDAY 28 MAY 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 (cm/mm)

READ INSTRUCTIONS OVERLEAF

DC (SM/SW) MEP60400 30403/1

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. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **A list of physics equations is printed on page three.**
- **The Periodic Table is provided separately.**
- **The total number of marks for this paper is 60.**

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

wave speed = frequency × wavelength

power = voltage × current

energy (kilowatt hours) = power (kW) × time (h)

Answer ALL the questions.

SECTION A – MODULE B1

1 The graph on page 5 opposite shows the percentage of very overweight (obese) people in six countries.

(a) Some of these countries have a higher percentage of obese men than obese women.

Write down the names of these countries.

_____ **[1]**

(b) Eating too much of which nutrient is most likely to cause obesity?

Put a (ring) around the correct answer.

CARBOHYDRATE

FIBRE

IRON

VITAMIN C

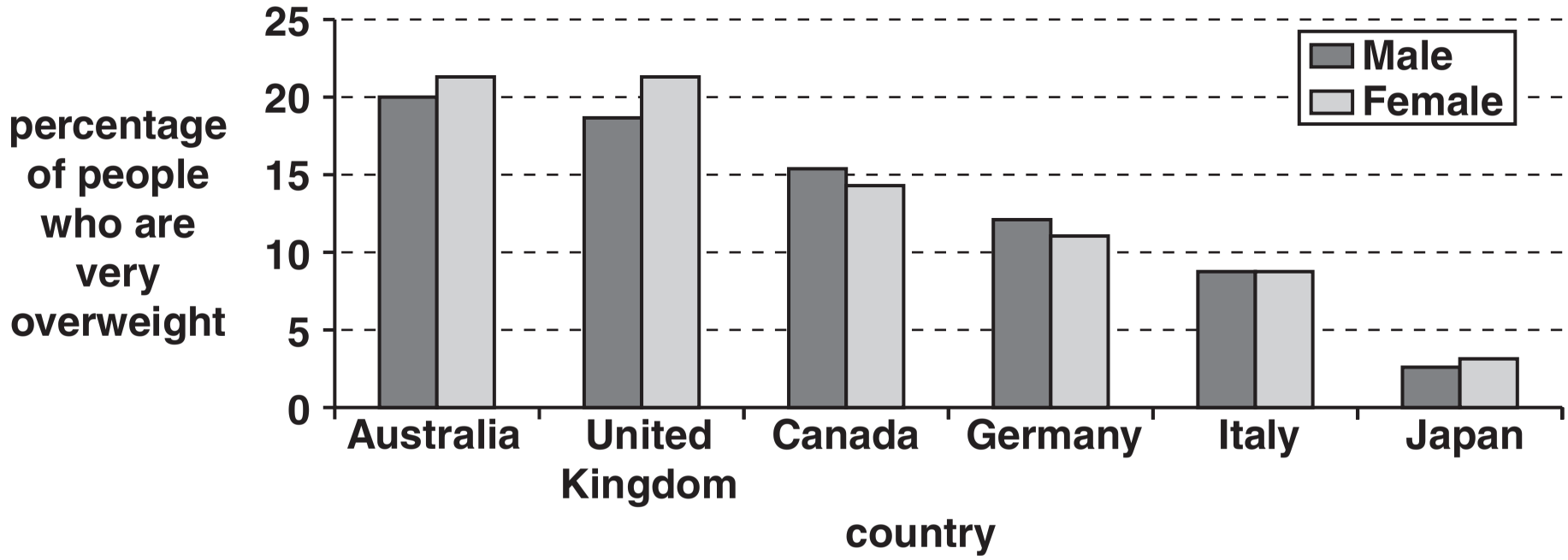
[1]

(c) Write down ONE health risk of being obese.

_____ **[1]**

[Total: 3]

5


percentage of people who are very overweight
25
20
15
10
5
0
Male
Female
Australia
United Kingdom
Canada
Germany
Italy
Japan
country

2 (a) Most people take their hands away very quickly if they pick up a hot object.

They do not have to think about doing this.

What type of action is this?

Choose your answer from:

HORMONE ACTION

SIMPLE REFLEX

VOLUNTARY RESPONSE

answer _____ [1]

(b) The pain caused by the hot object is detected by pain receptors in the skin.

Write down the name of <u>ONE OTHER</u> type of receptor in the skin.

_____ [1]

(c) Nerve cells carry impulses from the pain receptors to the central nervous system.

Put a tick (✓) next to the type of nerve cells that carry these impulses.

motor neurone	☐
relay neurone	☐
sensory neurone	☐

[1]

(d) Scientists have been investigating a young boy and his family.

The family cannot feel pain.

This is because they all have inherited a change in a single gene.

The gene codes for a substance that turns on the nerve cells that carry pain messages.

In people with the faulty gene the substance is not made.

(i) The relatives all have a copy of the gene that has been changed.

What is the name given to change in a gene?

_____ [1]

(ii) Where in the cell would scientists find the faulty gene?

Choose your answer from this list.

CELL MEMBRANE

CYTOPLASM

NUCLEUS

VACUOLE

answer _____ [1]

[Total: 5]

3 Anthony and Declan are talking about their fitness.

They both measure their resting pulse rate and blood pressure.

ANTHONY

Resting pulse rate 95
Blood pressure 150/95 mmHg

DECLAN

Resting pulse rate 75
Blood pressure 130/80 mmHg

(a) (i) Describe how Anthony and Declan could measure their pulse rates.

_____

_____ **[1]**

(ii) Anthony's blood pressure is higher than Declan's.

This could be because of differences in their diets.

Finish this sentence to suggest <u>ONE</u> possible difference in their diets.

Anthony's diet might contain _____

_____ **. [1]**

(b) Anthony is 35 years old.

He decides to exercise to get fitter.

He reads in a book that his pulse rate should go up to 70% of its maximum value during exercise.

The book shows a graph (on page 11 opposite).

(i) What should Anthony's pulse rate increase to when he exercises?

Use the graph to work out the answer.

answer _____ beats per minute. [1]

(ii) Increasing his pulse rate to 70% of its maximum value should make sure that he respires aerobically not anaerobically.

Write down <u>ONE</u> advantage of respiring aerobically rather than anaerobically.

_____

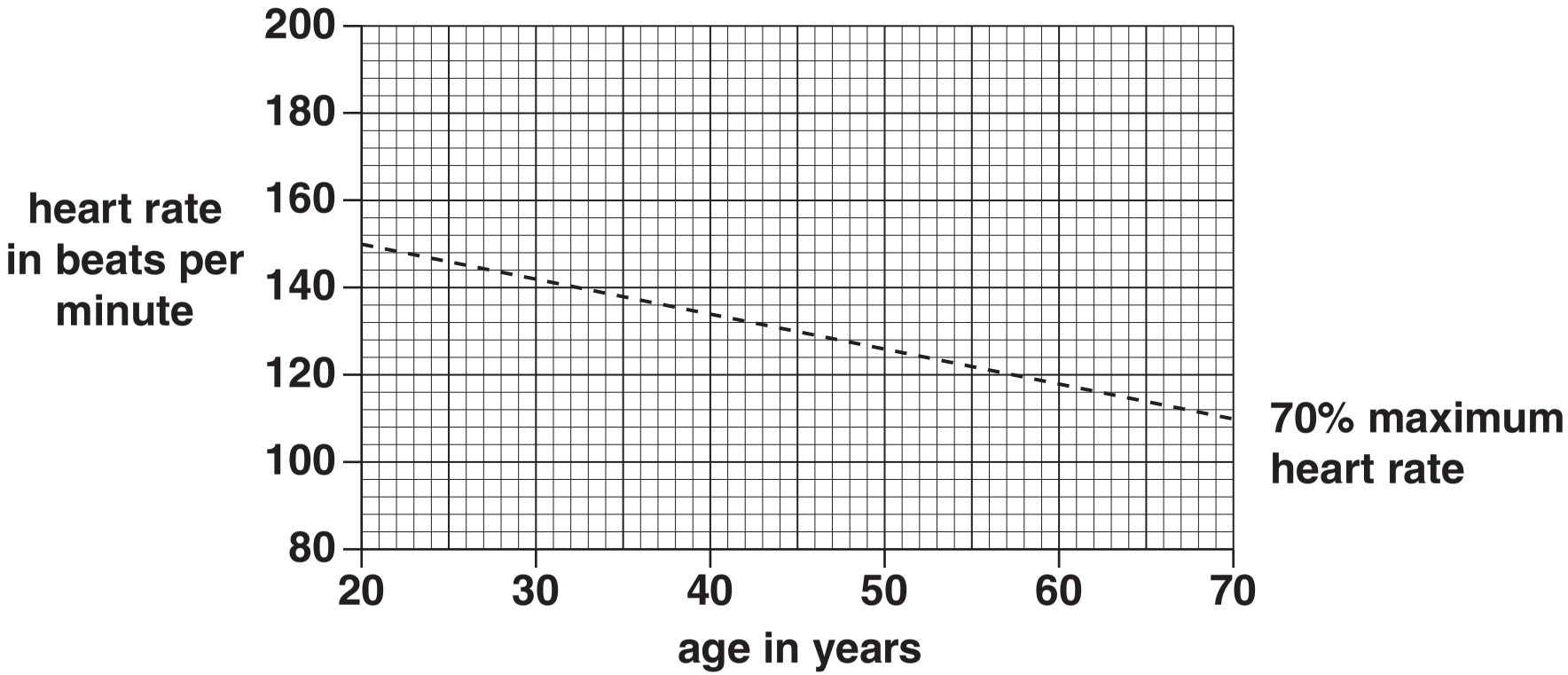
_____ **[1]**

(iii) Explain why it is necessary for a person's pulse rate to increase when they exercise.

_____

_____ **[2]**

[Total: 6]


heart rate in beats per minute
200
180
160
140
120
100
80
20
30
40
50
60
70
age in years
70% maximum heart rate

4 Jane and Sadia are planning a holiday to Africa.

(a) Jane is worried about getting cholera.

What type of microorganism causes cholera?

Put a (ring) around the correct answer.

BACTERIUM

FUNGUS

PROTOZOA

VIRUS

[1]

(b) Jane is unlikely to get malaria from drinking water.

How is malaria usually spread?

_____ **[1]**

(c) Sadia says that our bodies have defences against pathogens.

One of the body's defences against pathogens is the immune system.

Write down <u>ONE</u> way that the immune system can destroy pathogens.

_____ **[1]**

(d) If a person has malaria they develop a high body temperature.

(i) What is the <u>NORMAL</u> human body temperature?

_____ **°C** **[1]**

(ii) Explain how a very high body temperature can be harmful to the body.

_____

_____ **[2]**

[Total: 6]

SECTION B – MODULE C1

5 This question is about food and food additives.

(a) An additive is given an E number.

Look at the table. It gives some information about E numbers.

TYPE OF FOOD ADDITIVE	E NUMBER RANGE
food colours	E101 to E199
preservatives	E200 to E299
antioxidants	E300 to E321
emulsifiers and stabilisers	E400 to E499
sweeteners	E950 to E967

Look at the food label found on a packet of instant drink.

INGREDIENTS

Sugar, drinking chocolate, skimmed milk powder, vegetable oil, instant coffee, lactose, dried glucose syrup, E340, E452, E331, milk proteins, salt

(i) **What type of additive is E452?**

_____ **[1]**

(ii) **Which ingredient is present in the <u>GREATEST</u> amount?**

_____ **[1]**

(b) Some foods contain oil and water.

Sometimes they contain an emulsifier.

What is the job of an emulsifier?

_____ **[1]**

(c) Antioxidants are added to some foods.

Explain why.

_____ **[1]**

(d) Potatoes have to be cooked before they are eaten.

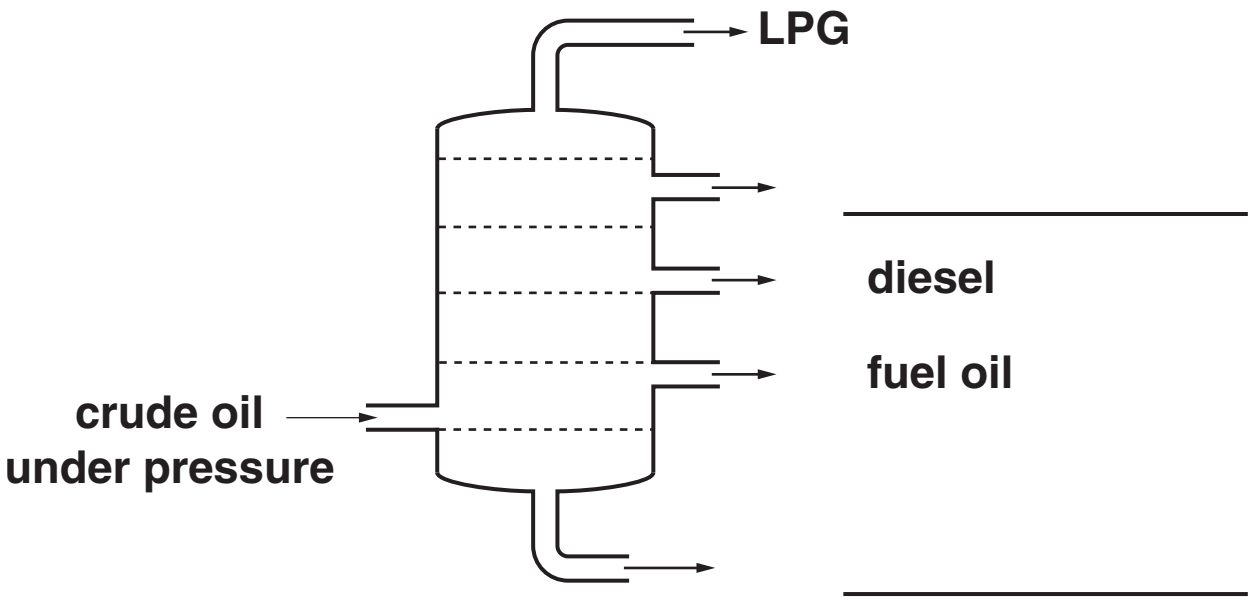
How does potato change when it is cooked?

_____ **[1]**

[Total: 5]

6 This question is about fractional distillation and cracking.

Look at the diagram. It shows a fractionating column.



Fractional distillation separates crude oil into <u>FRACTIONS</u>.

(a) Complete the diagram to show the missing fractions.

Choose from:

BITUMEN

HEATING OIL

PETROL

WAXES

[2]

(b) Some of the fractions from crude oil can be <u>CRACKED</u>.

Look at the diagram on page 19 opposite.

It shows how Julie does this in the laboratory using liquid paraffin.

(i) What is the job of the broken porcelain?

_____ **[1]**

(ii) Write down the name of liquid X.

_____ **[1]**

(c) Crude oil is carried in ships to oil refineries.

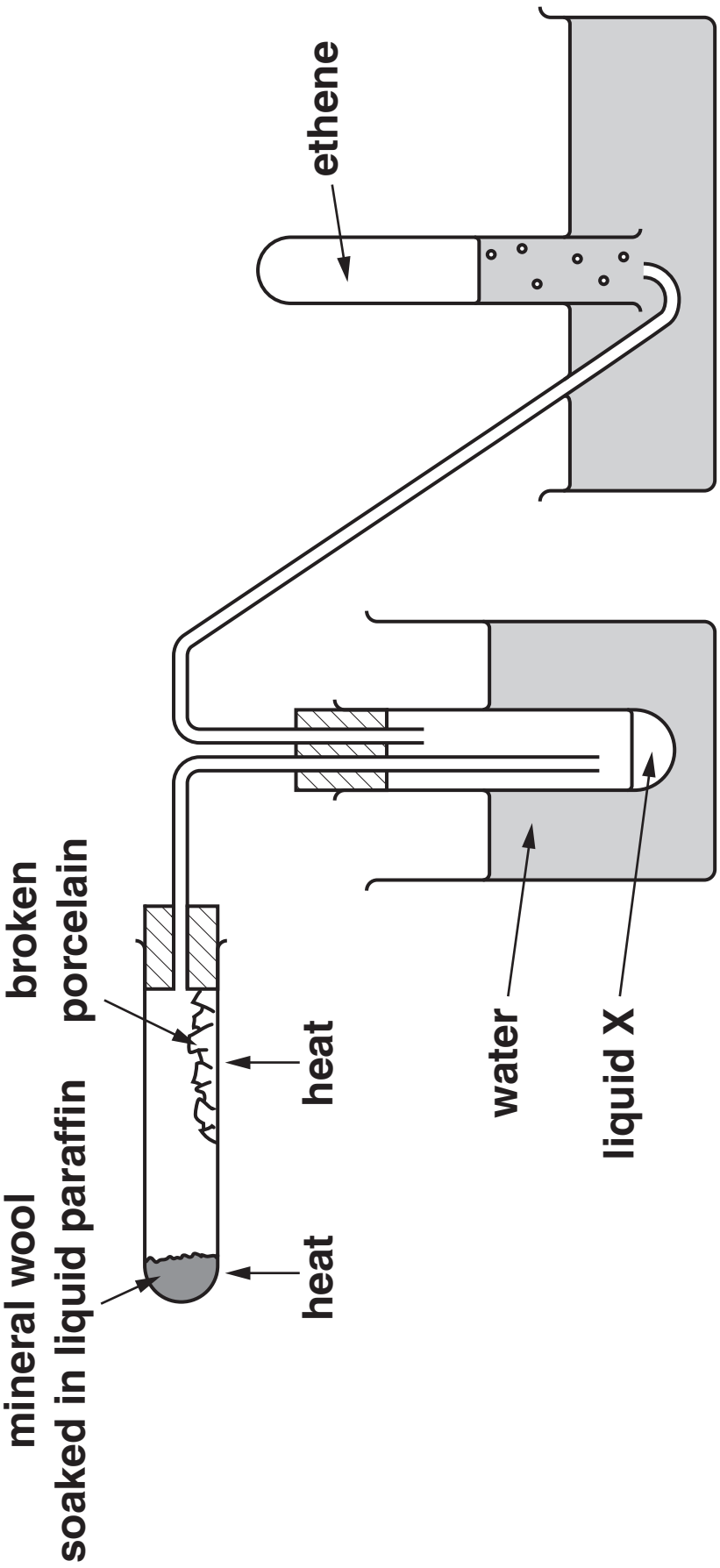
Sometimes crude oil is spilled into the sea.

Write about the problems caused when this happens.

_____

_____

_____ **[2]**


ethene
broken porcelain
mineral wool soaked in liquid paraffin
heat
heat
water
liquid X

[Total: 6]

7 Liz is designing a new power station.

She must choose a fuel to burn in the power station.

One of the factors she needs to consider is the cost of the fuel.

(a) Write about the <u>OTHER</u> factors Liz needs to think about when she chooses the fuel.

_____

_____

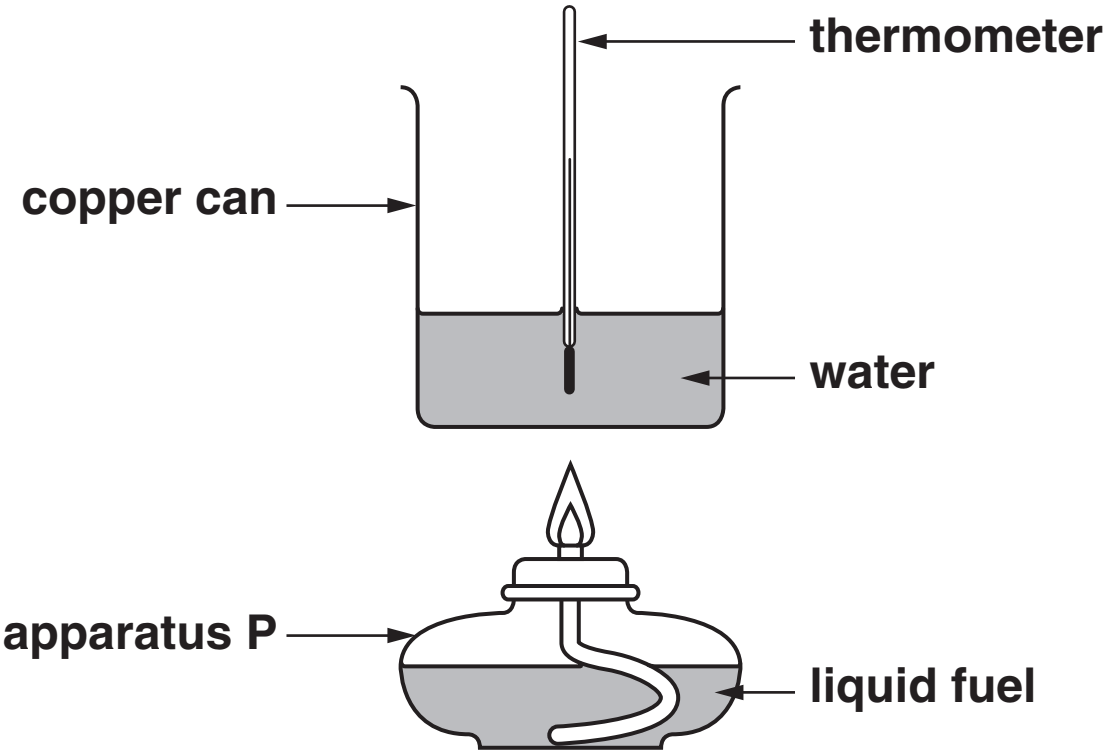
_____ **[2]**

(b) A gas from the air is used up when fuels burn.

Write down the name of this gas.

_____ **[1]**

(c) **Look at the diagram. It shows the apparatus Liz uses to compare three fuels.**



(i) **What is the name of apparatus P?**

_____ **[1]**

(ii) Look at the table. It shows Liz's results.

Complete the table.

FUEL	TEMPERATURE AT START IN °C	TEMPERATURE AT END IN °C	TEMPERATURE CHANGE IN °C
petrol	20	62	42
paraffin	22	60	38
ethanol	_____	55	30

[1]

(iii) Liz burns 1.0 g of each fuel.

Which fuel gives off <u>LEAST</u> energy?

_____

Explain your answer.

_____

_____ [2]

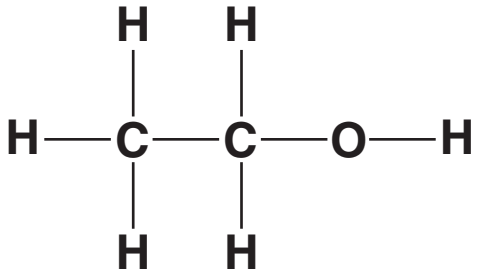
(d) Burning fuels is an <u>EXOTHERMIC</u> reaction.

What is meant by an exothermic reaction?

_____

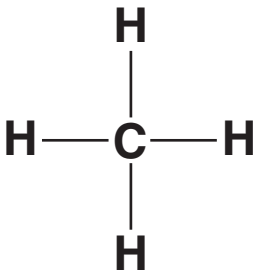
_____ [1]

(e) Look at the displayed formulas of some fuels.

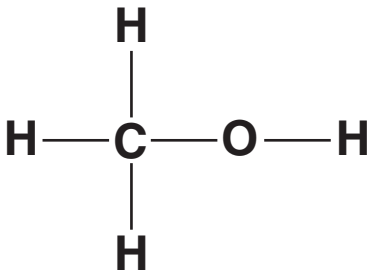


ETHANOL

HYDROGEN



METHANE



METHANOL

Which fuel is a <u>HYDROCARBON</u>?

answer _____ [1]

[Total: 9]

SECTION C – MODULE P1

8 (a) Look at the statements about MICROWAVES.

Some statements are true and some are false.

Put a tick (✓) in the correct box next to each statement.

Two have been done for you.

	TRUE	FALSE
They are electromagnetic waves.		
They are longitudinal.		✓
They penetrate to the centre of all foods.		
They are absorbed by water molecules.	✓	
They can go through plastic.		
They are reflected by metals.		
They can be absorbed by body tissues and cause burns.		

[2]

(b) Some people are concerned about children using mobile phones.

Mobile phones use MICROWAVE signals.

Write down TWO reasons why people are concerned about children using mobile phones.

1 _____

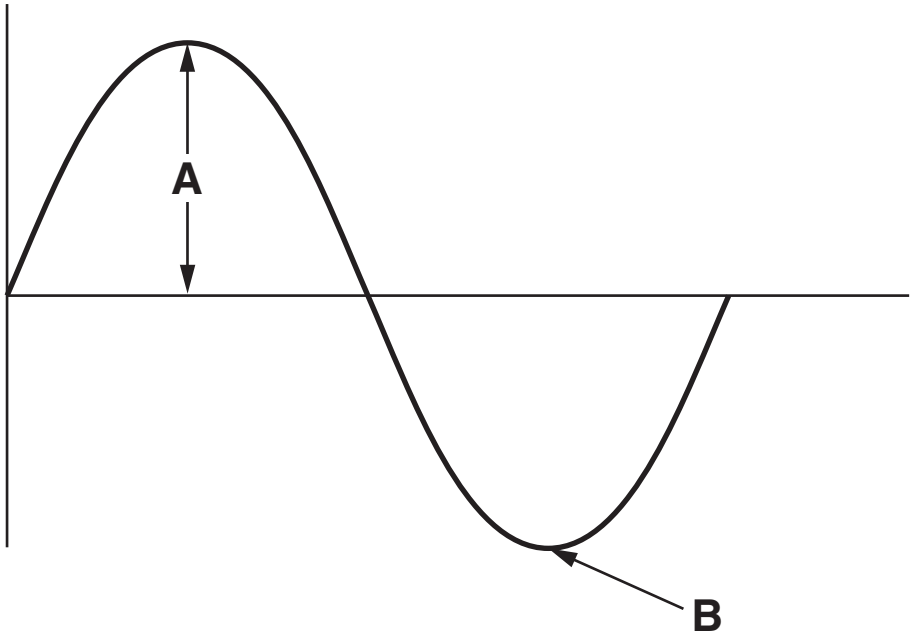
_____

2 _____

_____ **[2]**

[Total: 4]

9 (a) Look at the diagram of a wave.



(i) Write down the name of distance A.

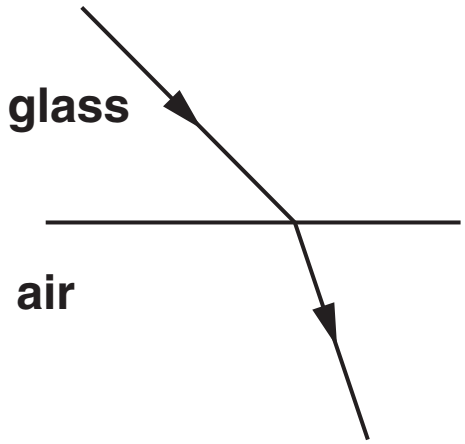
A is the _____
of the wave. [1]

(ii) Write down the name of point B.

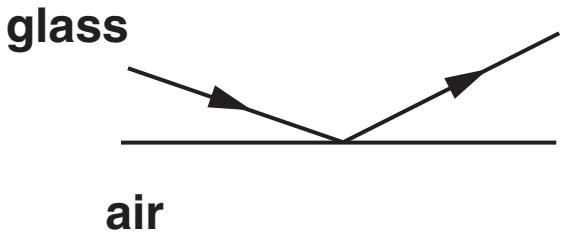
B is the _____
of the wave. [1]

(b) Look at the three diagrams.

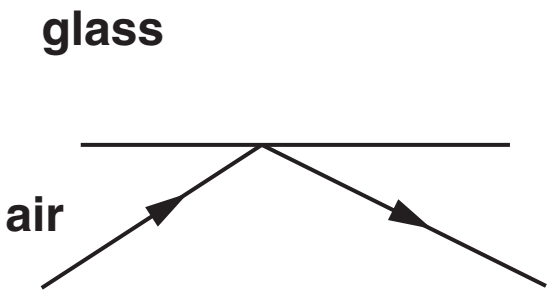
They show the path of light at the boundary between glass and air.



A



B



C

Which diagram shows total internal reflection (TIR)?

Choose from: A B C

answer _____ [1]

(c) Infrared sensors are used to switch on security lights when someone moves near the detector.

Where does the infrared radiation that is detected come from?

_____

_____ **[1]**

[Total: 4]

10 (a) Look at the list.

It shows some of the waves given out by the Sun.

INFRARED

ULTRAVIOLET

VISIBLE LIGHT

X-RAYS

Which type of wave causes sunburn?

Choose your answer from the list.

_____ **[1]**

(b) Scientists believe that global warming is caused by an increase in carbon dioxide in the atmosphere.

Where does this <u>EXTRA</u> carbon dioxide come from?

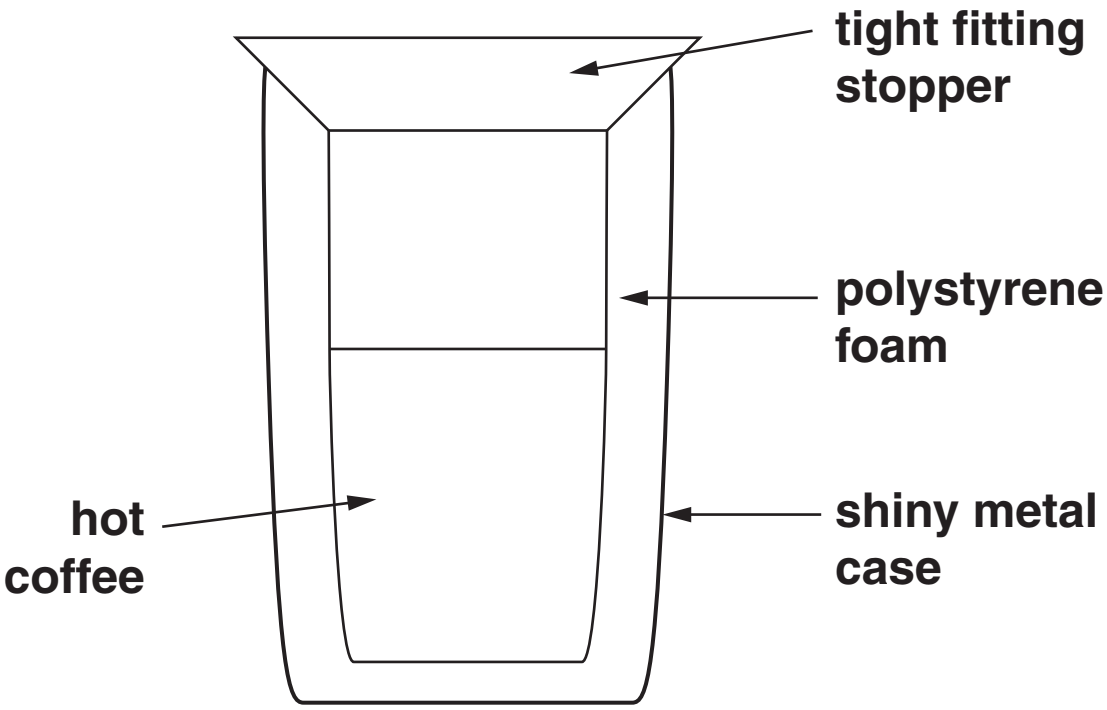
_____

_____ **[1]**

[Total: 2]

11 (a) Look at the diagram of a thermal mug.

It is used to keep coffee hot.



Explain how the thermal mug reduces energy transfer.

In your answer write about

- **conduction**
- **convection**
- **radiation.**

_____

_____

_____

_____

_____ **[3]**

(b) Look at the information about energy saving methods.

INSULATION METHOD	COST TO FIT IN £	PAYBACK TIME IN YEARS	SAVINGS EACH YEAR IN £	ENERGY SAVED EACH YEAR IN kWh
cavity wall insulation	960	4.0	240	2000
double glazing	3000	15.0	200	1667
draught excluders	48	0.5	96	800
loft insulation	240	2.0	120	

Energy costs 12p per kWh.

How many kWh of energy does loft insulation save each year?

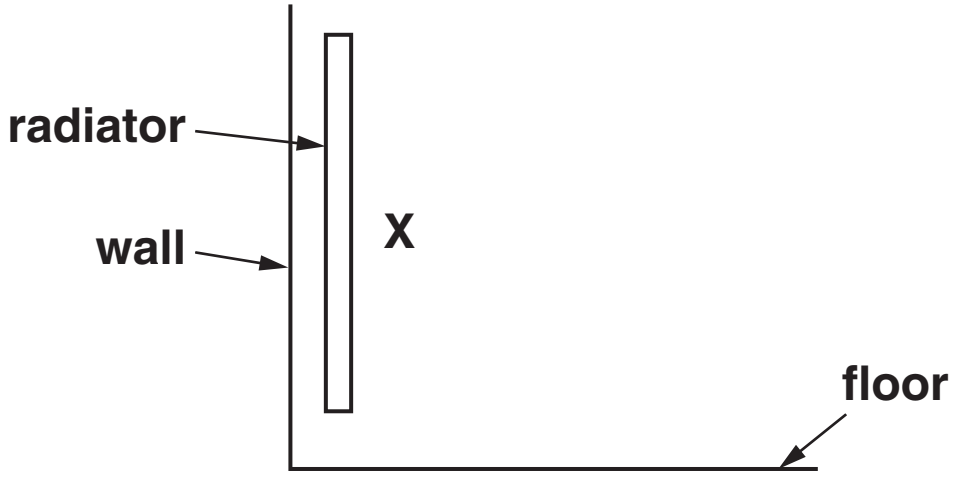
_____

_____

answer _____ kWh [1]

[Total: 4]

12 Look at the diagram of a radiator.



(a) The air next to the radiator gets hot.

Draw an arrow from X to show which way this air moves. [1]

(b) Air is a good insulator.

Insulation materials contain trapped air.

Polystyrene foam is one insulator that contains trapped air.

Write down one <u>OTHER</u> insulating <u>MATERIAL</u> that contains trapped air.

_____ **[1]**

[Total: 2]

13 (a) This question is about heat and radiation.

Look at the graph on page 35 opposite.

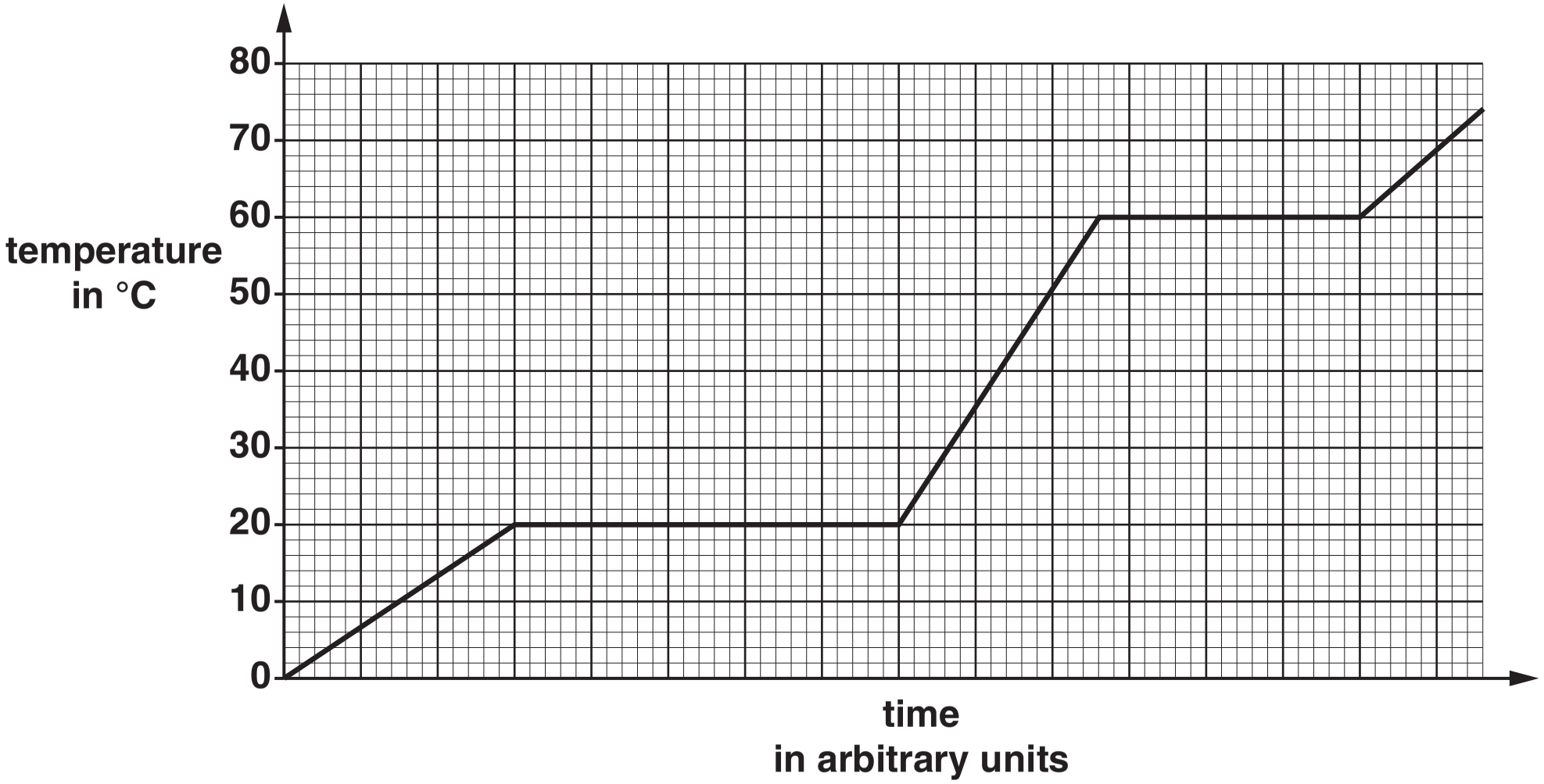
It shows how the temperature of a substance changes when it is heated.

The substance is a solid at 0 °C.

What temperature is the melting point?

answer _____ °C [1]

35


temperature
in °C
80
70
60
50
40
30
20
10
0
time
in arbitrary units

(b) Look at the table of five identical objects.

They are painted five different colours.

OBJECT	COLOUR
A	dull black
B	shiny black
C	shiny silver
D	dull silver
E	shiny white

(i) The five objects are all at the same temperature.

Which object <u>ABSORBS</u> the most radiation?

_____ **[1]**

(ii) What is the name of the radiation that is absorbed?

_____ **[1]**

(iii) All the objects emit (give out) radiation.

Jan wants the objects to emit <u>MORE</u> radiation.

She cannot change their colours.

What else could she do to the objects?

_____ **[1]**

[Total: 4]

END OF QUESTION PAPER

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