

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE

B711/01

GATEWAY SCIENCE
SCIENCE B

Science modules B1, C1, P1
(Foundation Tier)

THURSDAY 24 JANUARY 2013: Morning

DURATION: 1 hour 15 minutes
plus your additional time allowance

MODIFIED ENLARGED 18pt

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR SUPPLIED MATERIALS:

Periodic Table (inserted)

OTHER MATERIALS REQUIRED:

Pencil


Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer ALL the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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

- Your quality of written communication is assessed in questions marked with a pencil () .
- A list of equations can be found on pages 4 and 5.
- An enlarged copy of the Periodic Table is inserted.
- 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 75.

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EQUATIONS

$$\text{energy} = \text{mass} \times \frac{\text{specific heat}}{\text{capacity}} \times \text{temperature change}$$

$$\text{energy} = \text{mass} \times \text{specific latent heat}$$

$$\text{efficiency} = \frac{\text{useful energy output} (\times 100\%)}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy supplied} = \text{power} \times \text{time}$$

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{distance} = \text{average speed} \times \text{time}$$

$$s = \frac{(u + v)}{2} \times t$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

force = mass × acceleration

weight = mass × gravitational field strength

work done = force × distance

power = $\frac{\text{work done}}{\text{time}}$

power = force × speed

KE = $\frac{1}{2}mv^2$

momentum = mass × velocity

force = $\frac{\text{change in momentum}}{\text{time}}$

GPE = mgh

mgh = $\frac{1}{2}mv^2$

resistance = $\frac{\text{voltage}}{\text{current}}$

Answer ALL the questions.

SECTION A – MODULE B1

1 This question is about drugs.

(a) Different drugs have different effects on the body.

Draw straight lines from the DRUG to its EFFECT ON THE BODY.

DRUG	EFFECT ON THE BODY
depressant	block nerve impulses
hallucinogen	distorts what is seen and heard
pain killer	slows down brain activity

[2]

(b) James has drunk one and a half pints of beer and one gin and tonic.

(i) Explain how alcohol will affect James AND his driving.

[2]

- (ii) People who drink more than four units of alcohol are likely to be over the legal limit for driving.

Look at the table.

Drink	Amount	Units of alcohol
beer	one pint	2.3
gin and tonic	one measure	1.0
lager	one pint	3.4
wine	one glass	3.0
vodka	one measure	1.0

Can James legally drive? _____

Explain your answer.

_____ [2]

[TOTAL: 6]

2 Kerry and Abbas investigate the nervous system.

They ask people to test their reactions using a computer game.

The game uses a square that changes colour.

It times how long it takes someone to react to the change.

The table (opposite) shows the results.

(a) Look at Diane's results. One of her results is inaccurate.

This has made her mean too high.

Calculate the mean for Diane WITHOUT the inaccurate result.

mean = _____ seconds [2]

Name	Sex	Age in years	Time taken to react in seconds					
			Attempt 1	Attempt 2	Attempt 3	Attempt 4	Attempt 5	Mean
Colin	male	16	0.28	0.34	0.33	0.33	0.40	0.34
Diane	female	55	0.39	0.45	0.44	0.40	1.43	0.62
Ewan	male	14	0.31	0.28	0.24	0.30	0.33	0.29
Freda	female	72	0.53	0.48	0.54	0.48	0.53	0.51
Tom	male	12	0.26	0.29	0.30	0.30	0.27	0.28

(b) Kerry and Abbas write down some conclusions about their data.

Put a tick (✓) next to each of the TWO conclusions that best match their data.

Colin's reactions improved with practice.

☐

The males have faster reactions than the females.

☐

Reactions slow down as you get older.

☐

Younger people can follow instruction better.

☐

Ewan plays a lot of computer games.

☐

[2]

(c) To test their reactions the individuals use their eyes to see the colour change.

Which part of the eye detects the colour change?

_____ **[1]**

(d) Some people inherit genetic disorders.

Which of these genetic disorders is most likely to be a problem in this investigation?

Put a tick (✓) next to the BEST answer.

cystic fibrosis

☐

colour blindness

☐

sickle cell anaemia

☐

[1]

[TOTAL: 6]

3 Gemma finds out about problems caused by different diets.

Read the information that Gemma finds out about diets with high salt levels.

Many people are concerned about the amount of salt in their diet. Salt contains the element sodium. There are limits to the amount of sodium you should eat each day.

The table shows the suggested values for daily sodium intake.

minimum amount of sodium the body needs each day	500 mg
maximum daily intake for a healthy adult UNDER 50	2300 mg
maximum daily intake for a healthy adult OVER 50	1500 mg

The average daily intake of sodium for people in America is 3400 mg.

Some people are concerned that this amount of sodium could lead to health problems.

Use the data and your scientific knowledge to explain if people should be concerned.



The quality of written communication will be assessed in your answer to this question.

[6]

[TOTAL: 6]

4 Read the information about some diseases.

Disease	Type of pathogen that causes disease	How the pathogen gets into body	Some countries where the disease occurs
diphtheria	bacteria	through the nose	Brazil South Africa India
malaria	protozoa	when an infected mosquito bites you	China Kenya Gambia
cholera	bacteria	drinking contaminated water	Kenya India Vietnam
typhoid	bacteria	drinking contaminated water	Kenya India Vietnam
yellow fever	virus	when an infected mosquito bites you	Brazil Kenya Gambia

Use the information in the table to answer these questions.

- (a) Mucus on the lining of your airways can help prevent disease.**

Write down the name of the disease that this mucus could help prevent.

_____ **[1]**

- (b) Sally is going on holiday to Brazil.**

Which TWO diseases should she be vaccinated against?

and _____ **[1]**

- (c) Use the table to write about the similarities and differences between malaria and yellow fever.**

_____ **[2]**

(d) When a pathogen enters the body the immune system can destroy the pathogen.

Describe how the immune system can destroy pathogens.

[3]

[TOTAL: 7]

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SECTION B – MODULE C1

5 This question is about pigments in paints.

Pigments give paints their colour.

Look at the table. It shows information about some pigments used in paints.

Pigment	Colour	Effect of increasing the temperature	Effect of light	Type of paint made
A	blue	no change	no change	oil based
B	yellow	no change	colour fades	emulsion
C	red	changes to yellow	colour fades	oil based
D	green	colour fades	absorbs light and later gives off light	emulsion

(a) (i) Which pigment is MOST resistant to fading from exposure to light and high temperatures?

Choose from A, B, C or D.

answer _____ [1]

(ii) Which pigment is thermochromic?

Choose from A, B, C or D.

answer _____ [1]

(b) Paints also contain a BINDING MEDIUM and a SOLVENT.

What are the jobs of the binding medium and of the solvent?

_____ [2]

(c) David paints his steel bike.

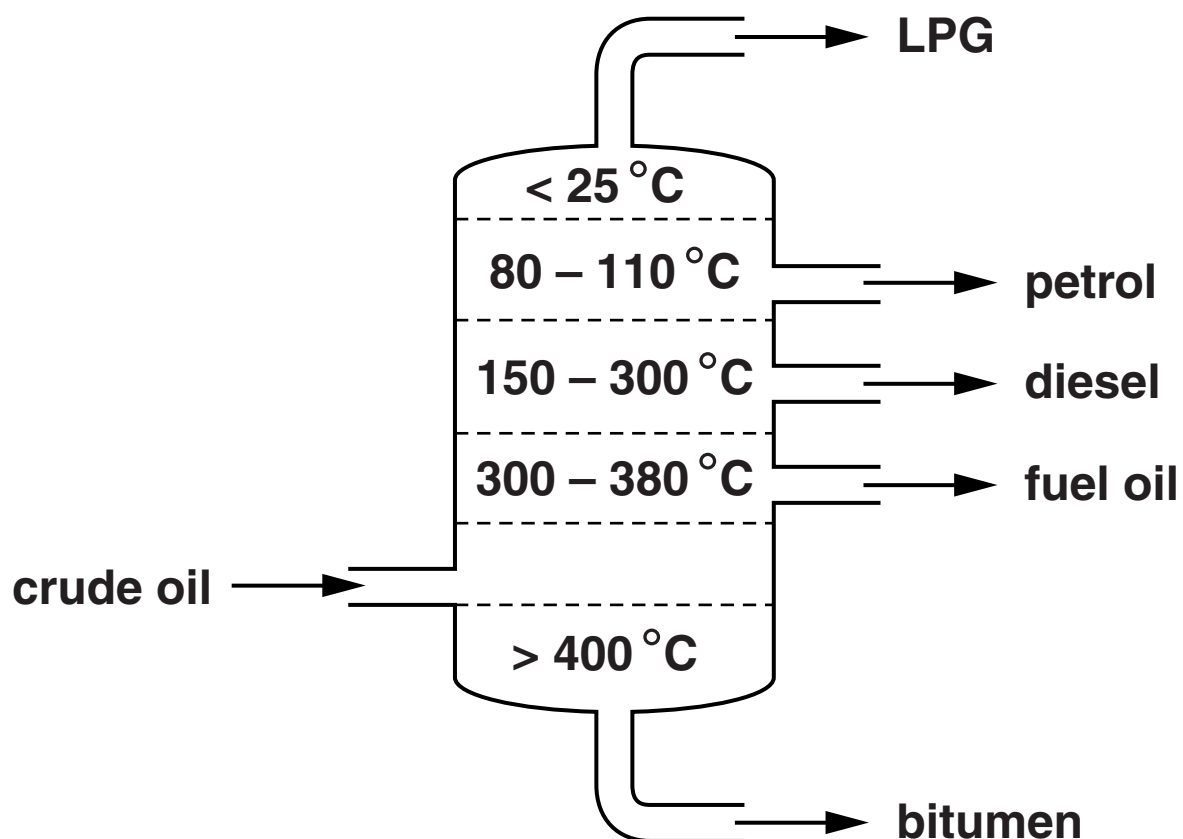
Explain why David paints his bike.

_____ [2]

[TOTAL: 6]

6 Look at the diagram of a fractionating column.

It shows the temperatures inside the column and some of the fractions made.



(a) Write down the name of ONE OTHER fraction obtained from crude oil.

_____ [1]

(b) Look at the table. It shows some carbon compounds and their boiling points.

Compound	Boiling point in °C	Fraction
butane	0	_____
heptane	99	petrol
eicosane	344	_____
dodecane	216	_____

Complete the table to show which fraction each compound belongs to.

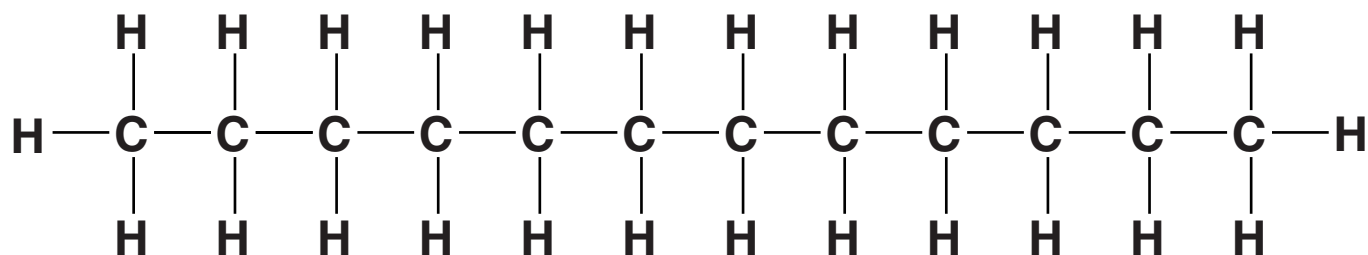
One has been done for you. [2]

(c) Crude oil is a NON-RENEWABLE fuel.

What is meant by a non-renewable fuel?

_____ [2]

(d) Look at the displayed formula of dodecane.



Complete the sentences.

The number of ELEMENTS in dodecane is

_____ .

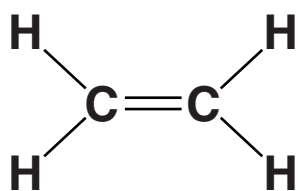
The total number of ATOMS in one molecule of

dodecane is _____ . **[2]**

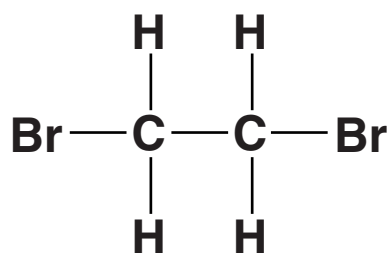
[TOTAL: 7]

- 7 Look at the displayed formulas of ethene and two compounds that can be made from ethene.

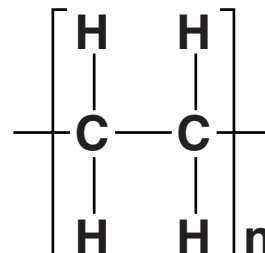
ethene



compound A



compound B



Write about the TYPES of compound shown and describe how ethene can be changed into compound B.



The quality of written communication will be assessed in your answer to this question.

[6]

[TOTAL: 6]

8 Look at the table (opposite). It shows information about gases which pollute the air.

(a) Which gas could be carbon monoxide?

answer _____ [1]

(b) Karen thinks that pollutant gases A, C and D all cause acid rain.

Does the evidence support this?

Explain your answer.

_____ [3]

(c) Cars are fitted with catalytic converters.

What is the job of a catalytic converter?

_____ [1]

(d) Methane burns in oxygen.

Carbon dioxide and water are made.

Write a WORD equation for this reaction.

_____ [1]

[TOTAL: 6]

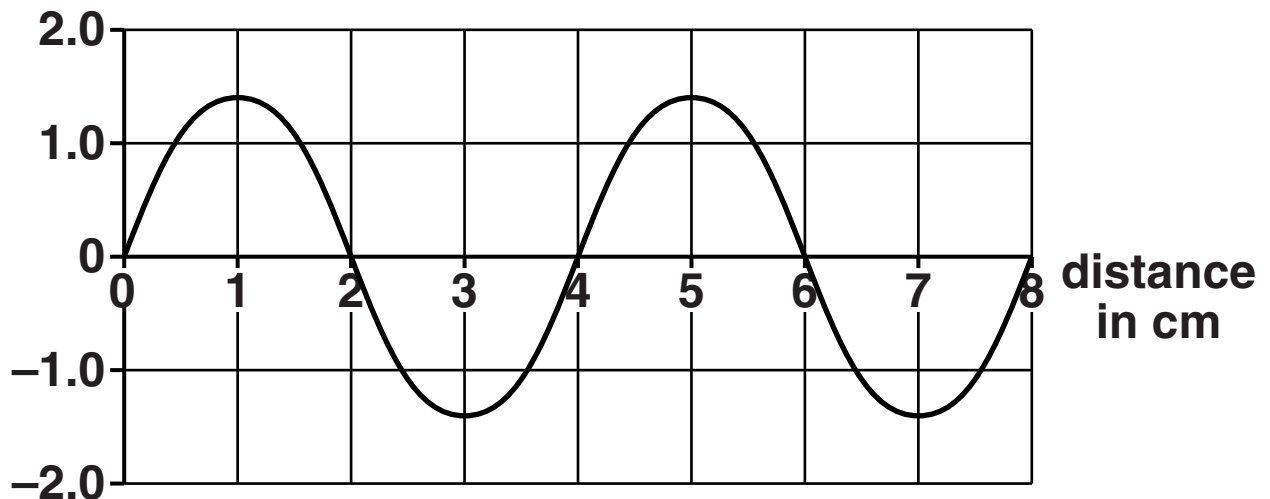
Pollutant gas	Solubility in water	pH of solution	Effect on marble statues	Effect on steel	Effect on humans
A	very soluble	8	none	none	none
B	insoluble	not applicable	none	none	poisonous
C	very soluble	3	reacts slowly	increases rusting	causes coughing
D	very soluble	4	reacts slowly	increases rusting	causes coughing and photochemical smog

SECTION C – Module P1

9 This question is about waves.

Look at the diagram of a wave.

displacement in cm



(a) (i) What is the amplitude of the wave?

answer _____ cm [1]

(ii) What is the wavelength of the wave?

answer _____ cm [1]

(b) The wave has a frequency of 600 Hz.

Calculate the speed of the wave in cm/s.

answer _____ cm/s [2]

[TOTAL: 4]

10 (a) Some parts of the world have earthquakes.

Write down the name of the equipment used to detect earthquakes.

_____ **[1]**

(b) Earthquakes produce shock waves that pass through the Earth.

Write about the effects of these shock waves.

_____ **[2]**

(c) Mark likes to sunbathe.

In the UK, he can stay in the sun for 60 minutes before he burns.

In Mexico, where it is hotter, he can stay in the sun for only 20 minutes before he burns.

Suggest things he could do to safely stay out in the sun in Mexico.

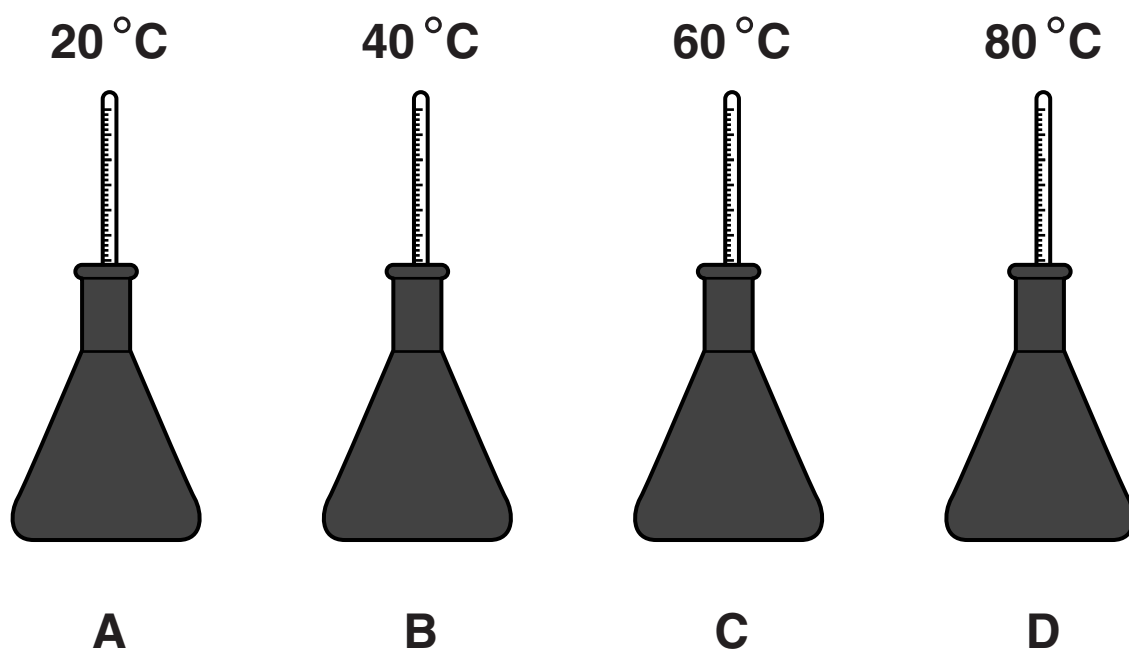
_____ **[2]**

[TOTAL: 5]

11 Nadine is performing experiments about infrared radiation.

Look at the diagram of the equipment she uses.

It shows four identical flasks full of water at DIFFERENT temperatures.



The flasks are all painted with the same black paint.

(a) Which flask gives out the most infrared radiation?

Choose from A, B, C or D.

answer _____ [1]

(b) Nadine then uses four identical flasks of DIFFERENT colours.

Each of the coloured flasks contains water at 60 °C.

The list shows the colours of the flasks.

Put a tick (✓) in the box next to the flask which cools down the quickest.

FLASK COLOUR

dull black

☐

shiny black

☐

silver

☐

white

☐

[1]

[TOTAL: 2]

12 (a) Oliver wants to reduce his energy bills.

Look at the information about energy saving features for his home.

Energy saving feature	Cost	Saving per year
cavity foam insulation for the walls	£500	£100
double glazing for ALL windows	£3000	£150
draught proofing for ALL windows and doors	£50	£30
loft insulation	£200	£100

Oliver has a budget of £500 per year for 6 years to spend on energy saving features.

Oliver knows that payback time is important.

Suggest how Oliver should spend his budget over the 6 years.



The quality of written communication will be assessed in your answer to this question.

[6]

(b) In recent years, house builders have been installing better insulation in new houses.

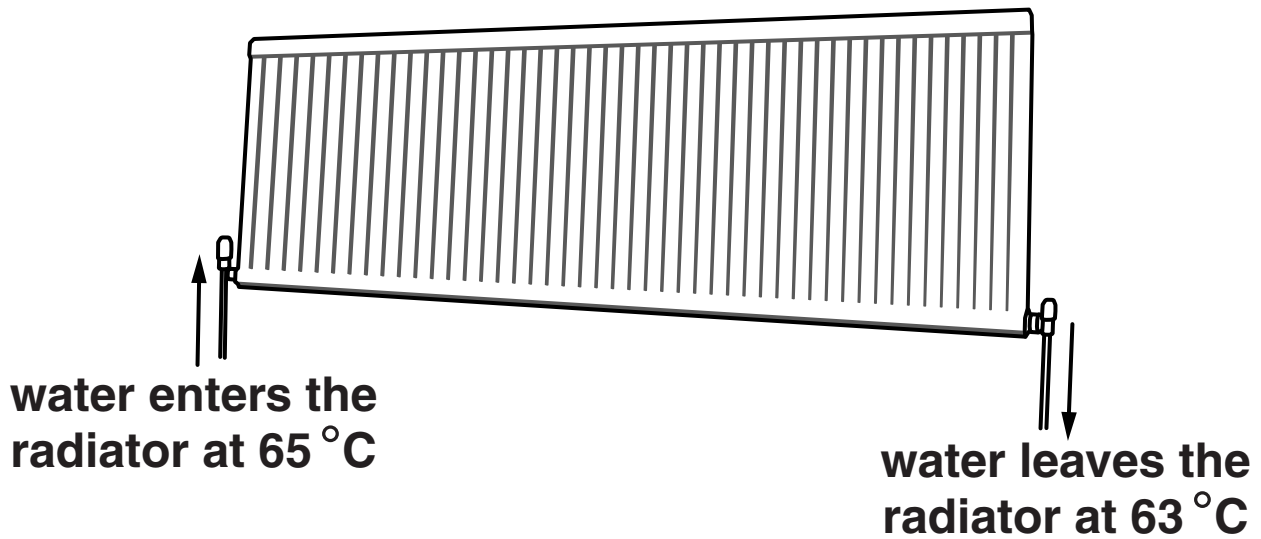
Suggest reasons why.

[2]

[TOTAL: 8]

13 Finn's living room is heated by a radiator.

Look at the diagram.



Water enters the radiator at 65°C and leaves at a temperature of 63°C .

2 kg of water flows through the radiator each second.

The specific heat capacity of water is $4200\text{ J/kg}^{\circ}\text{C}$.

(a) Calculate the amount of heat energy given out by 2 kg of water as it passes through the radiator.

answer _____ **J [2]**

(b) How could he increase the amount of heat energy given out?

_____ **[1]**

[TOTAL: 3]

14 Television remote controls use digital infrared signals to change channels.

(a) Which one of the diagrams (opposite) shows a digital signal?

Choose from A, B, C or D.

answer _____ [1]

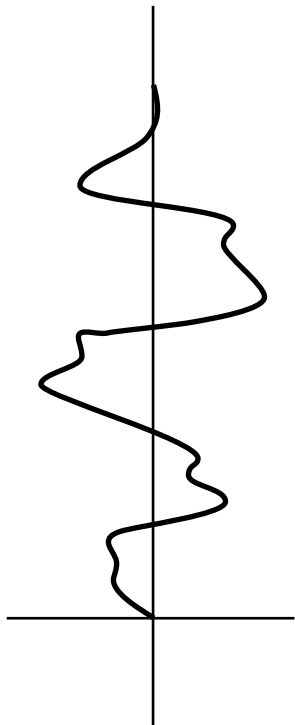
(b) Write about other uses of infrared radiation.

[2]

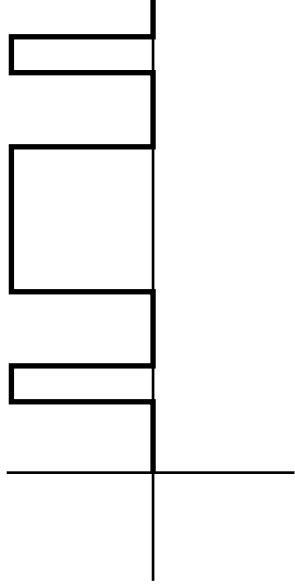
[TOTAL: 3]

END OF QUESTION PAPER

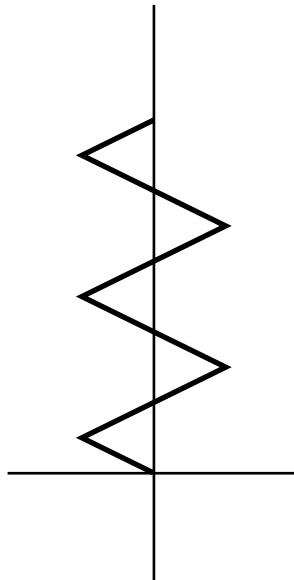
A



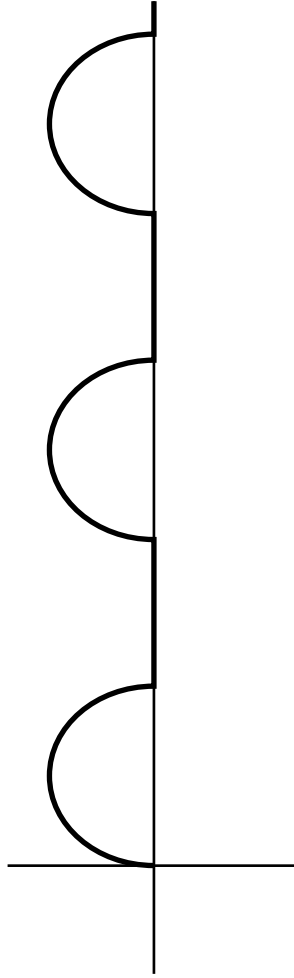
B



C



D



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