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3102/1

BGCSE

School Number	Candidate Number
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COMBINED SCIENCE

PAPER 1 3102/1

Wednesday **31 MAY 2006** 12.00 – 1.15 P.M.

Additional materials:
None

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS TO CANDIDATES

Write your school number, candidate number, surname and initials in the spaces provided on this page.

There are **FIFTY** questions on this paper.

Attempt **ALL** questions.

For each question there are **FOUR** possible answers labelled, A, B, C and D. Choose the **ONE** you consider correct and record your choice by circling the letter next to the answer on the question paper.

A copy of the Periodic Table is printed on page 2.

Calculators are permitted, however **NO** graphing calculators are allowed.

FOR EXAMINER'S USE	
TOTAL	

This question paper consists of 21 printed pages and 3 blank pages.

hydrogen 1 H 1.00794												helium 2 He 4.002602			
lithium 3 Li 6.941												boron 5 B 10.811			
beryllium 4 Be 9.0122												carbon 6 C 12.011			
sodium 11 Na 22.990												nitrogen 7 N 14.007			
magnesium 12 Mg 24.305												oxygen 8 O 15.999			
												fluorine 9 F 18.998			
												neon 10 Ne 20.180			
												aluminum 13 Al 26.982			
												silicon 14 Si 28.086			
												phosphorus 15 P 30.974			
												sulfur 16 S 32.065			
												chlorine 17 Cl 35.453			
												argon 18 Ar 39.948			
potassium 19 K 39.098		calcium 20 Ca 40.078												gallium 31 Ga 69.723	
rubidium 37 Rb 85.468		strontium 38 Sr 87.62												germanium 32 Ge 72.61	
cesium 55 Cs 132.91		barium 56 Ba 137.33												arsenic 33 As 74.922	
francium 87 Fr [223]		radium 88 Ra [226]												selenium 34 Se 78.96	
		57-70 * Lu [174.97]		57-70 * Hf [178.49]		57-70 * Ta [180.95]		57-70 * W [183.84]		57-70 * Re [186.21]		57-70 * Os [190.23]			
		89-102 * Lr [262]		89-102 * Rf [261]		89-102 * Db [262]		89-102 * Sg [266]		89-102 * Bh [264]		89-102 * Hs [269]			

1.

A person picks up the telephone after hearing it ring.

Which characteristics of living organisms are shown by this action?

- A excretion and reproduction
- B growth and respiration
- C irritability and movement
- D nutrition and respiration

2.

The table shows characteristics of four vertebrates, P, Q, R and S.

features	vertebrates			
	P	Q	R	S
has hair	✓		✓	
has feathers		✓		
has scales				✓
constant body temperature	✓	✓	✓	✓
lays eggs		✓		✓
internal fertilization	✓	✓	✓	✓
produces milk	✓		✓	

Which TWO vertebrates are most closely related?

- A P and Q
- B P and R
- C Q and S
- D R and S

3. Which particle is always present in the nucleus of an atom?

- A electron
- B ion
- C neutron
- D proton

4. What happens to water molecules when ice changes to water?

They

- A become more ordered.
- B begin to move faster.
- C lose energy.
- D move more slowly.

5. Which of the following is an example of a physical change?

- A burning gasoline
- B burning paper
- C melting ice cubes
- D rusting of iron

6. What is the opposition to the flow of electrons through a conductor called?

- A current electricity
- B resistance
- C static electricity
- D voltage

7. What is the main purpose of an electric iron?

To transfer electrical energy to

- A chemical energy.
- B heat energy.
- C light energy.
- D sound energy.

8. Which cell is responsible for the uptake of water and mineral salts from the soil?



A



B



C



D

9. Which life process occurs **only** in plants?

- A excretion
- B photosynthesis
- C respiration
- D reproduction

10. Which fruit is dispersed by the wind?



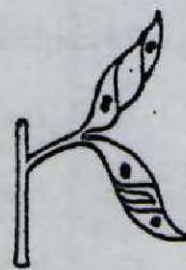
A



B



C



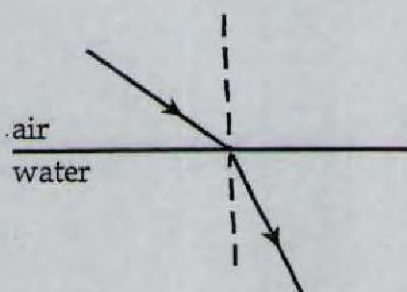
D

11. What is the ability of a metal to be hammered or shaped without breaking called?

- A conductivity
- B ductility
- C malleability
- D porosity

12. The diagram shows a ray of light passing from air into water.

Which process is shown?



- A absorption
- B radiation
- C reflection
- D refraction

13. A molecule of glucose has the formula $C_6H_{12}O_6$.

How many atoms are in this molecule?

- A 6
- B 12
- C 18
- D 24

14. Which element is most likely to be found uncombined in nature?

- A aluminium
- B calcium
- C iron
- D nitrogen

15. Which statement about protozoa is correct?

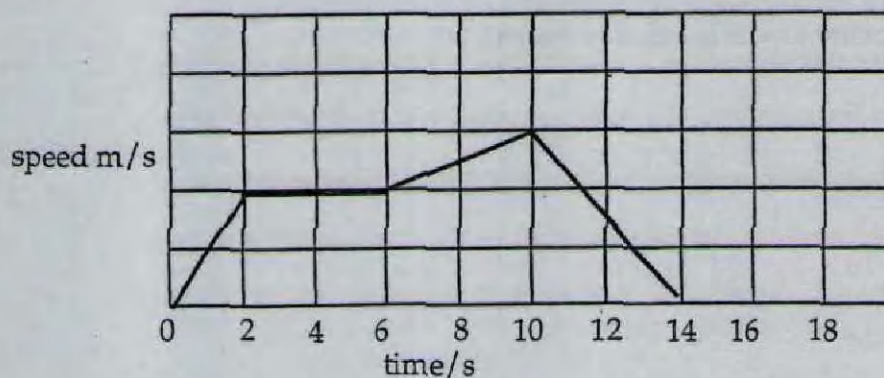
They are

- A autotrophs.
- B parasites.
- C multicellular.
- D unicellular.

16. Which organism causes AIDS?

- A a bacteria
- B a fungi
- C a mosquito
- D a virus

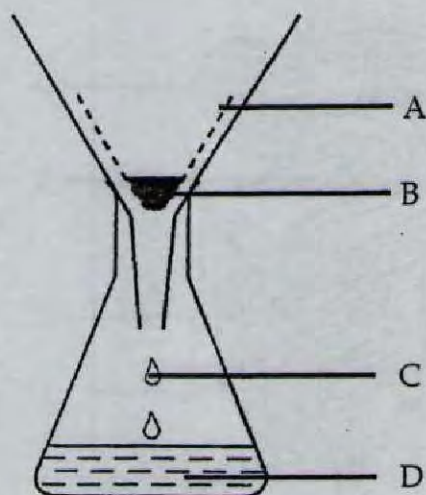
17. The speed-time graph is for a cyclist.



During what time interval was the cyclist travelling at a constant speed?

- A 0 s to 2 s
 - B 2 s to 6 s
 - C 6 s to 10 s
 - D 10 s to 14 s
18. What is power?
- A measure of the
 - A force which produces motion.
 - B rate of change of energy.
 - C rate of change of momentum.
 - D total work done.
19. Which piece of apparatus is used to find the mass of an irregular shaped object?
- A balance
 - B displacement can
 - C measuring cylinder
 - D pipette

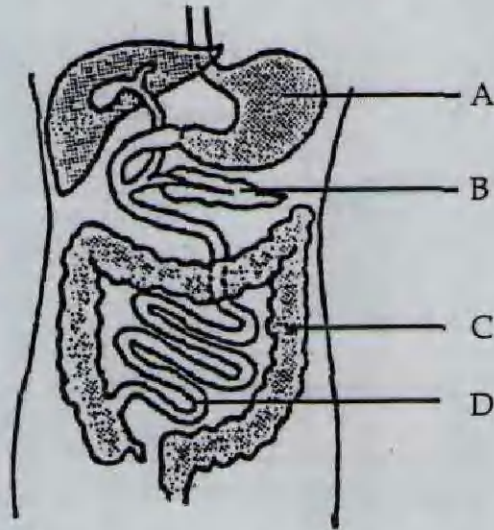
20. The diagram illustrates a method of separating a mixture.



Which letter labels the residue?

21. Oxygen is used in respiration and in welding using acetylene.
Which substances are produced as a result of these two processes?
- A carbon dioxide only
 - B carbon dioxide and water
 - C neither carbon dioxide nor water
 - D water only
22. Which instrument detects and tests small electric charges?
- A an ammeter
 - B an electroscope
 - C an electromagnet
 - D a voltmeter

23. The diagram shows the human alimentary canal.



Which labelled structure contains villi?

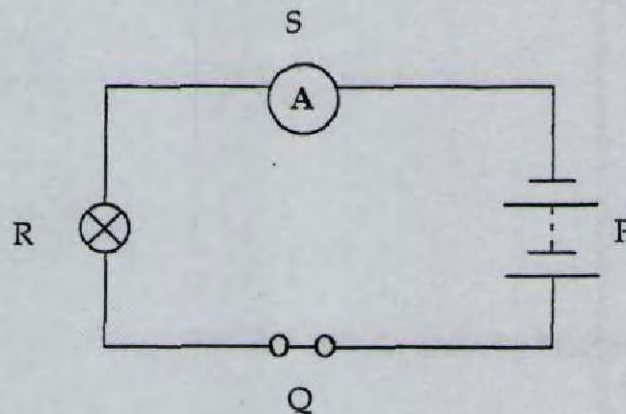
24. The percentage composition by weight of a food is shown in the chart.

food	percentage
carbohydrates	4.7
proteins	3.3
fats	3.8
water	88.2

Which food is this composition most likely to represent?

- A milk
- B potatoes
- C roast beef
- D whole wheat bread

25. The diagram represents an electric circuit.



Which labelled part pushes electrons through the circuit?

- A P
 - B Q
 - C R
 - D S
26. The pictures show a series of activities.
- Which picture shows work being done?



A
standing up
holding a bag



B
lifting up
a box



C
holding
a ladder



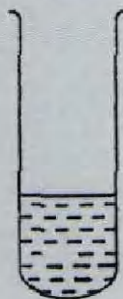
D
sitting on
a chair

27. Which pair of elements will form an ionic bond?

- A Ar and O
- B Cl and C
- C H and O
- D Na and Cl

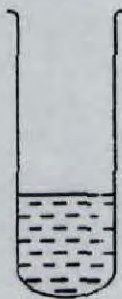
28. Which of these is NOT a solution?

dilute
sulphuric
acid



A

distilled
water



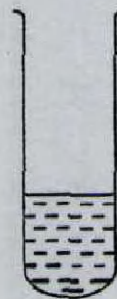
B

tea



C

sea
water



D

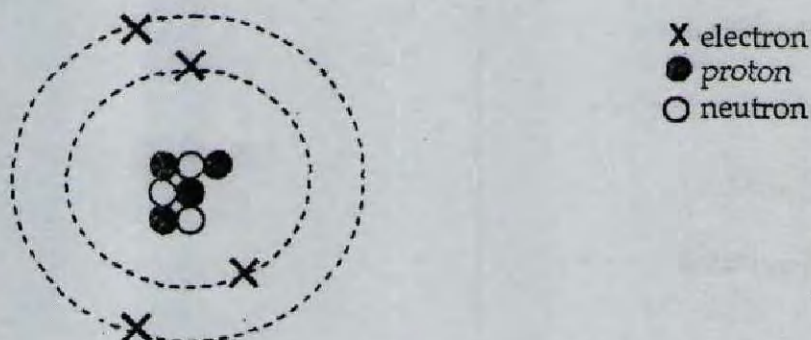
29. When a bottle of household ammonia is opened, its smell can be detected all around the room.

By which method does the gas move?

- A conduction
- B diffusion
- C radiation
- D osmosis

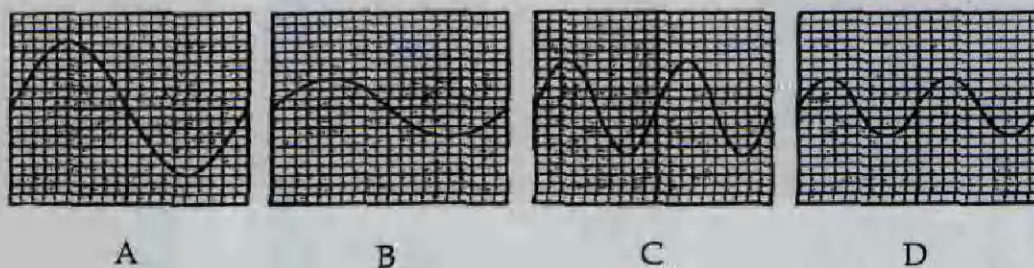
30. Which chamber of the heart pumps blood to the lungs?
- A right atrium
 - B right ventricle
 - C left atrium
 - D left ventricle
31. What is the function of the kidneys?
- A to remove water and urea
 - B to remove water only
 - C to produce water and urea
 - D to produce urea only
32. Which gas is given off when hydrochloric acid reacts with magnesium?
- A carbon dioxide
 - B chlorine
 - C hydrogen
 - D oxygen

33. The diagram represents the structure of one atom of an element.



What is the atomic number of this element?

- A 3
 B 4
 C 7
 D 11
34. Which mechanical wave has the greatest energy?



35. A Royal Bahamas Defence Force Marine sees the flare from a distress rocket in the sky and 5 seconds later he hears the blast.

How far is the distress rocket from the marine? (speed of sound in air = 330 m/s)

- A 66 m
 B 325 m
 C 335 m
 D 1650 m

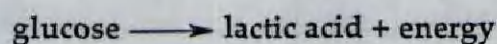
36. The drawing shows a mangrove plant.



What purpose are the structures labelled X adapted for?

- A gaseous exchange
 - B osmosis
 - C photosynthesis
 - D transpiration
37. How is cocaine classified?
- A a depressant
 - B an hallucinogen
 - C a sedative
 - D a stimulant

38. The equation summarises a process that takes place in the human body.



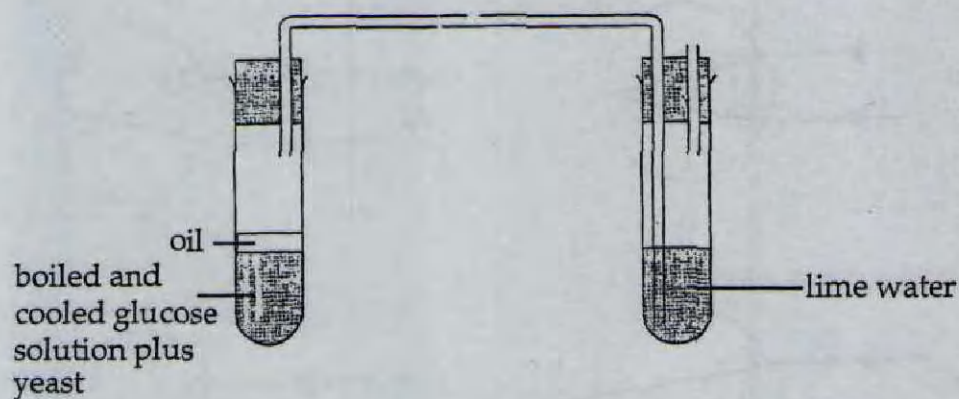
In which part of the human body is this process likely to occur?

- A liver
 - B lungs
 - C muscles
 - D stomach
39. The main gases in air are nitrogen and oxygen.

Which letter best describes the percentage (%) of these two gases in normal air?

letter	nitrogen (%)	oxygen (%)
A	33	67
B	25	75
C	50	50
D	80	20

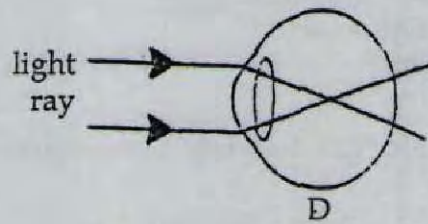
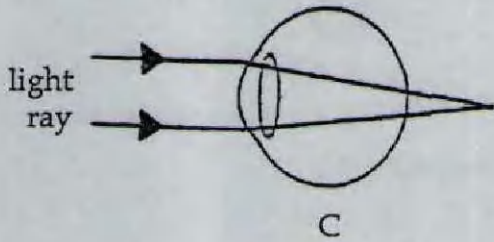
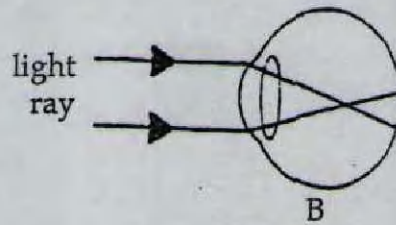
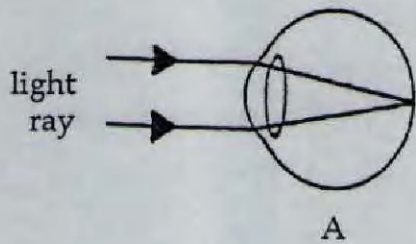
40. The apparatus is used to investigate anaerobic respiration.



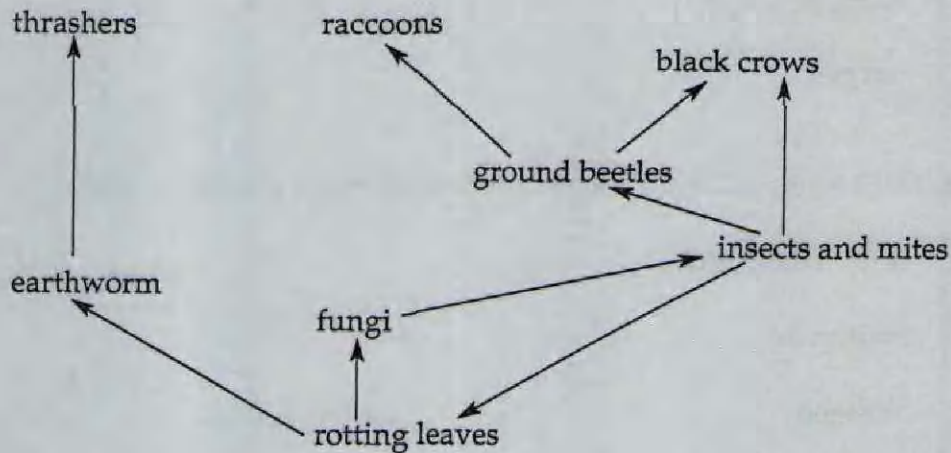
Which gas does lime water show the presence of?

- A carbon dioxide
 - B carbon monoxide
 - C nitrogen
 - D oxygen
41. What is the name of a harmful gas in the air which forms acid rain?
- A carbon monoxide
 - B hydrogen
 - C nitrogen
 - D sulphur dioxide
42. Which characteristics describe the images formed by a concave lens?
- A erect, virtual
 - B enlarged, real
 - C enlarged, virtual
 - D real, reduced

43. Which diagram shows the image correctly focused?



44. The diagram shows a food web.



What will happen to this food web if the earthworms, insects and mites are removed?

- A The population of black crows will increase.
- B The population of fungi will increase.
- C The population of raccoons will increase.
- D The population of thrashers will increase.

45. Which is a property of all alkalis?

They

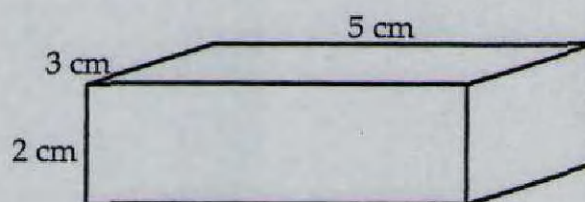
- A are solid at room temperature.
- B have a pH of less than 7.
- C react with carbonates to give CO_2 .
- D turn red litmus paper blue.

46. When a sample of pond water is tested with Universal Indicator, it turns a yellow-orange colour.

Which number most closely describes the pH of this sample of pond water?

- A 8
- B 7
- C 5
- D 2

47. The diagram shows a wooden block of 150 g and its dimensions.



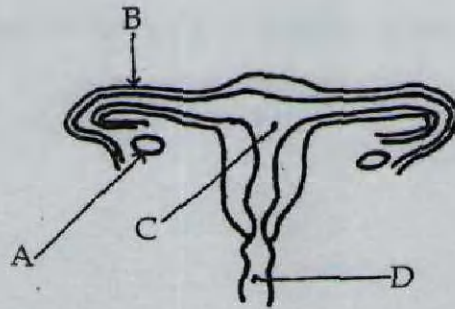
What is its density?

- A 2 g/cm^3
- B 3 g/cm^3
- C 4 g/cm^3
- D 5 g/cm^3

48. What happens when the north pole of a bar magnet is brought near the head of an iron nail?

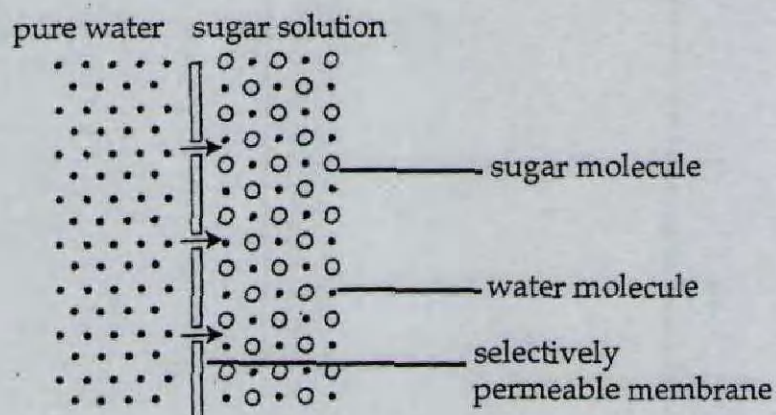
The head of the nail

- A becomes a north pole.
 - B becomes a south pole.
 - C is unaffected.
 - D repels the magnet.
49. The diagram shows the female reproductive system.



Where would a doctor place an intra-uterine device (IUD)?

50. The diagram shows water molecules passing into a sugar solution.



What is this process called?

- A active transport
- B evaporation
- C osmosis
- D transpiration stream

School Number	Candidate Number
Surname and Initials	

COMBINED SCIENCE

PAPER 2 3102/2

Wednesday **31 MAY 2006** 1.20 – 2.50 P.M.

Additional material:
None

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

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INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided at the top right hand corner of this page.

Answer **ALL** the questions on this paper in the spaces provided.

Read each question carefully and make sure you know what you have been asked to do before starting your answer.

The number of marks is given in brackets [] at the end of each question or part question.

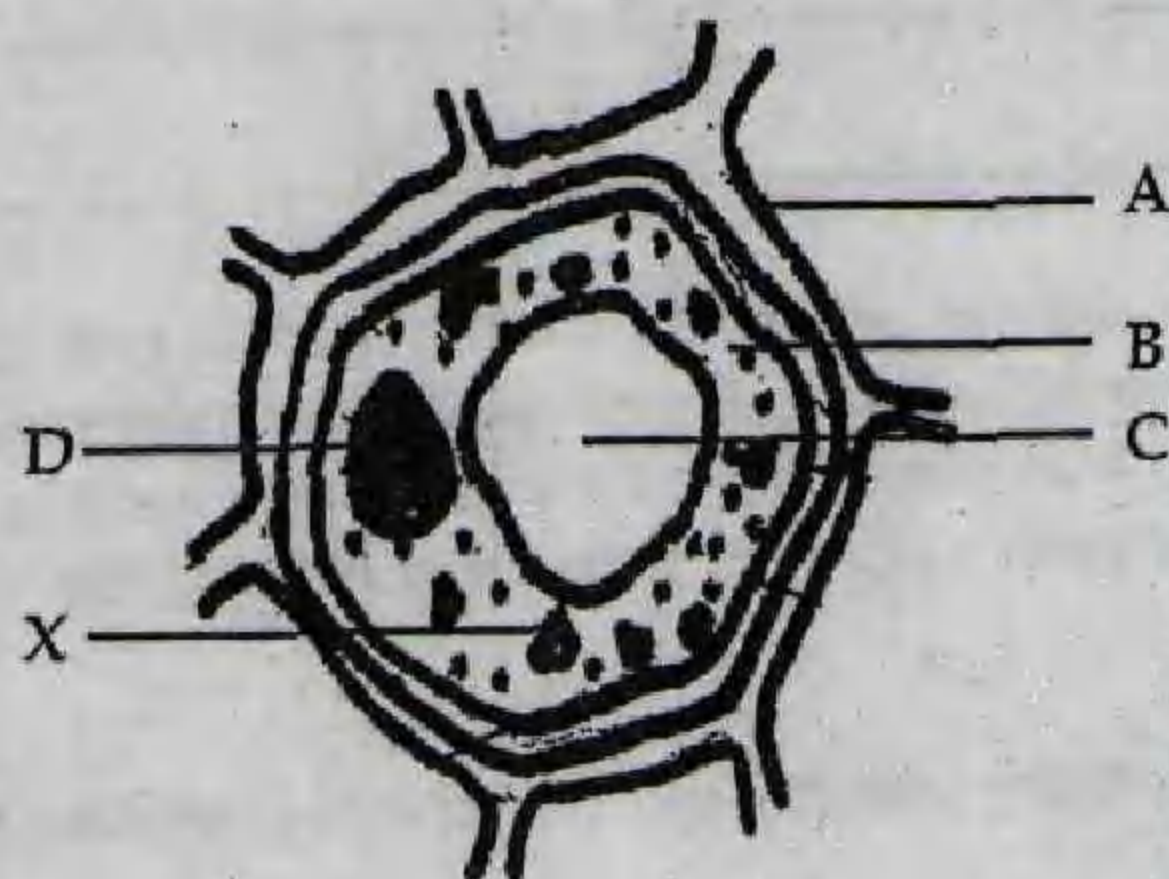
A copy of the Periodic Table is printed on page 2.

Calculators are permitted, however **NO** graphing calculators are allowed.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

This question paper consists of 18 printed pages and 2 blank pages.

1. The diagram shows a cell taken from a potato tuber.



- (a) Name the structures labelled A, B, C and D.

A _____

B _____

C _____

D _____

[3]

- (b) Name a typical plant cell structure that is missing from the potato cell and give a reason why it is missing.

name _____

reason _____

[2]

- (c) The structure labelled X turns blue black in the presence of iodine solution.

Give a reason for this change in structure X.

[1]

- (d) Structure A is permeable while structure B is described as selectively permeable. Describe the term selectively permeable.

_____ [1]

- (e) Three identical strips were cut from a second potato tuber and their masses recorded. Two strips were placed in different sucrose solutions and one strip was placed in water. The strips were left overnight. The new mass for each strip was then recorded and the results are shown in the table.

- (i) Complete the missing information to complete the table. [2]

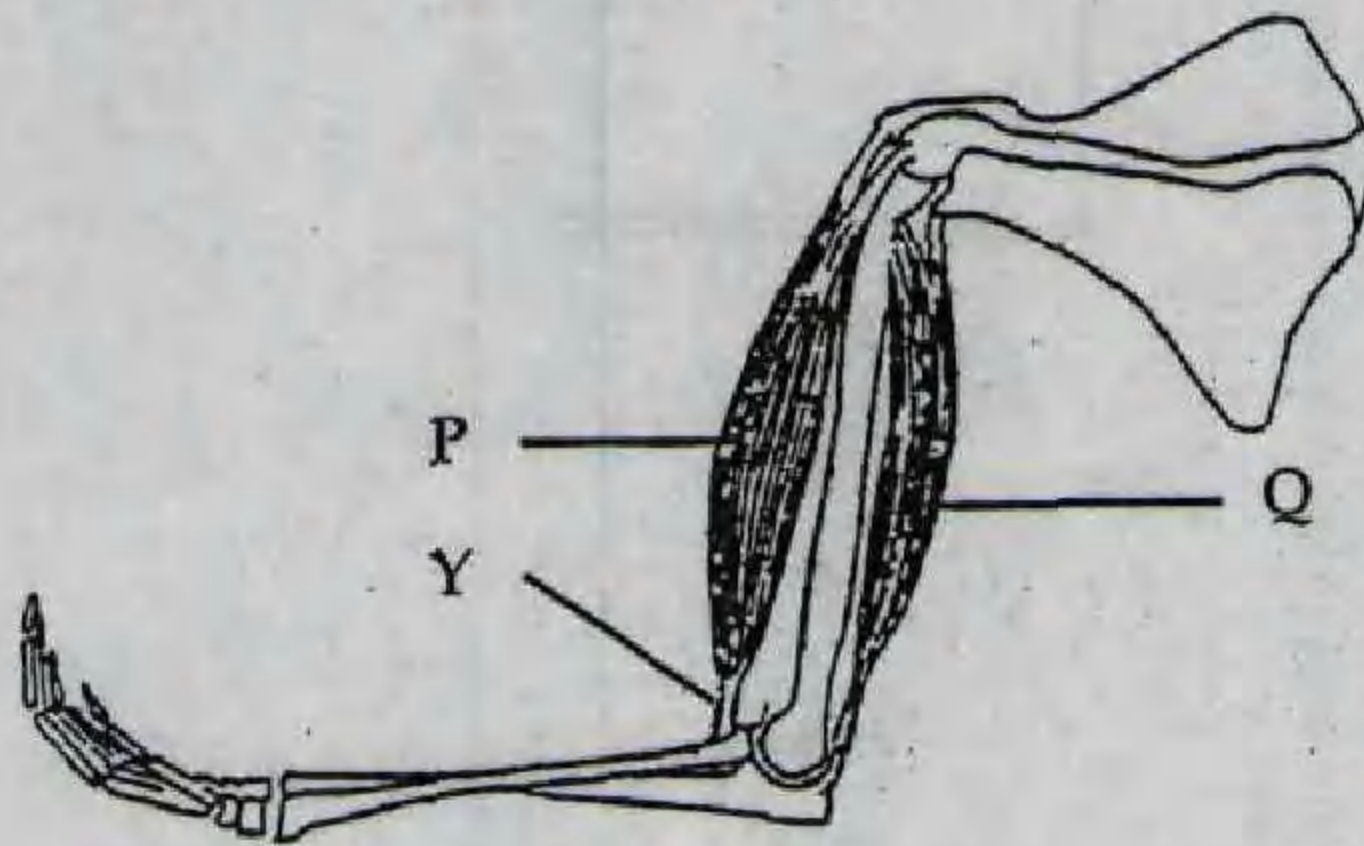
solution	initial mass of strip/g	final mass of strip/g	change in mass for strip/g
A	7.4	6.5	
B		6.8	0.1
C	7.4	8.2	0.8

- (ii) Name the process that causes the change in mass in the potato strips.

_____ [1]

Total marks [10]

2. The diagram shows the bones and some of the muscles involved in the movement of the elbow joint.



- (a) Name the muscles labelled P and Q.

P _____

Q _____

[2]

- (b) Muscles P and Q are antagonistic muscles.
Explain the term **antagonistic**.

[1]

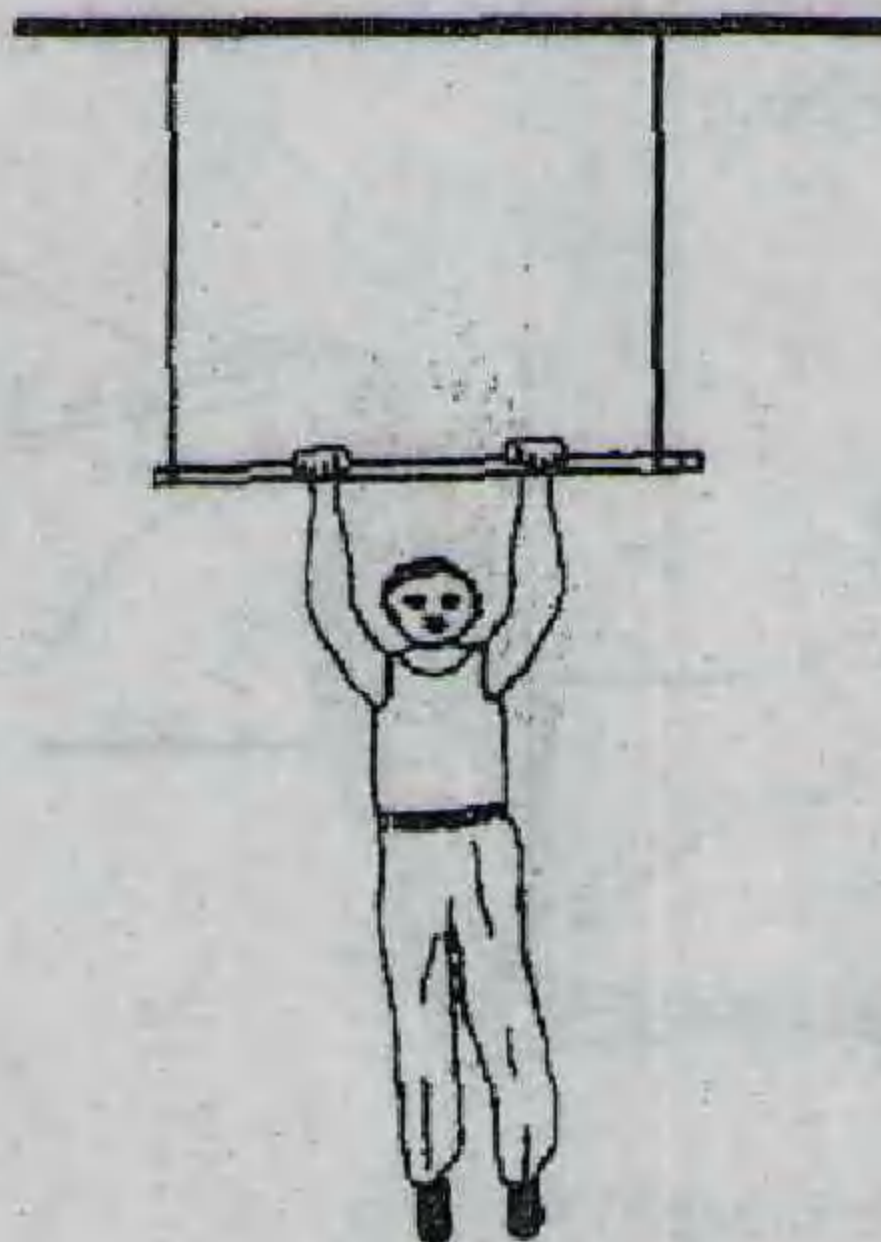
- (c) Name structure Y and state its function.

name _____

function _____

[2]

- (d) Rick, a gymnast, hangs by his hands from a horizontal bar.



Name the muscle which will act to pull his body up towards the bar and state how it will act.

muscle _____

action _____ [2]

- (e) Muscles P and Q contain many more mitochondria than skin cells.

Suggest why.

_____ [1]

- (f) Name the fluid found at the elbow joint and state its function.

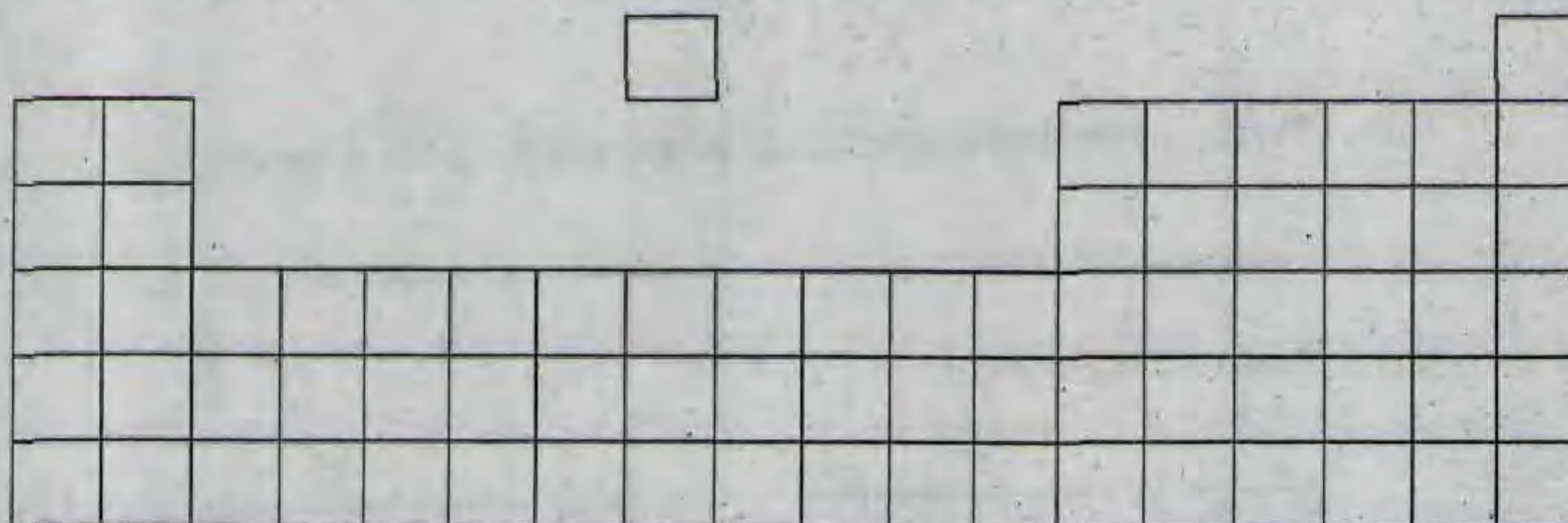
name _____

function _____

_____ [2]

Total marks [10]

3. The diagram shows an outline of the Periodic Table.



- (a) Use the letters A to E, in the correct places in the table to fit the descriptions.

A – an element found in Group VI and period 2.

B – the element with an atomic number of 11.

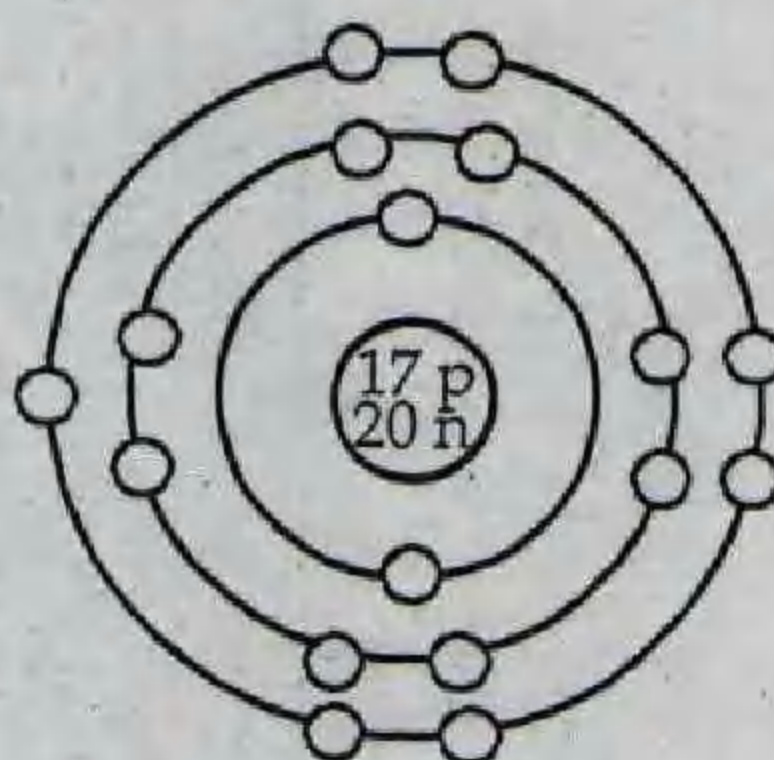
C – the most reactive alkaline earth metal.

D – the lightest element.

E – the element used to sterilize water.

[5]

- (b) The diagram shows the atomic structure of an element.



Determine

- (i) the atomic number of the element

[1]

(ii) the atomic mass (mass number) of the element

[1]

(iii) Write down the electronic configuration of the element.

[1]

(iv) Name the element.

[1]

(v) Classify the element as a metal or non-metal.

[1]

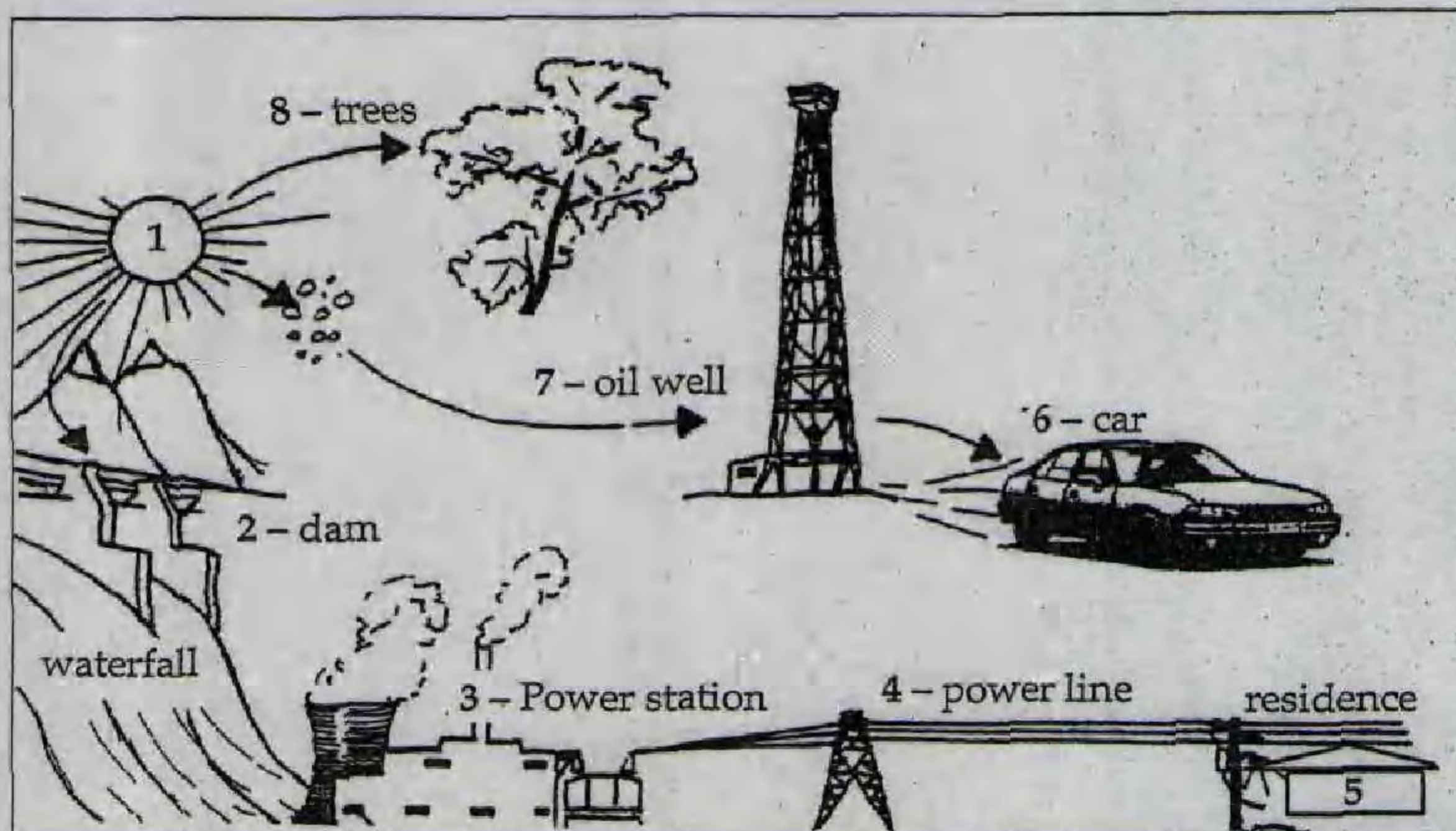
Total marks [10]

4. Energy can exist in various forms.

(a) Define the term energy.

[1]

The diagram shows various types of energy transfer.



(b) (i) Name the Earth's main source of energy.

[1]

(ii) Name TWO forms of energy which come from the source named in (b)(i).

1 _____ 2 _____ [2]

(c) State the type of energy changes occurring

(i) from number 1 to number 8.

_____ to _____ [2]

(ii) from number 4 to number 5.

_____ to _____ [2]

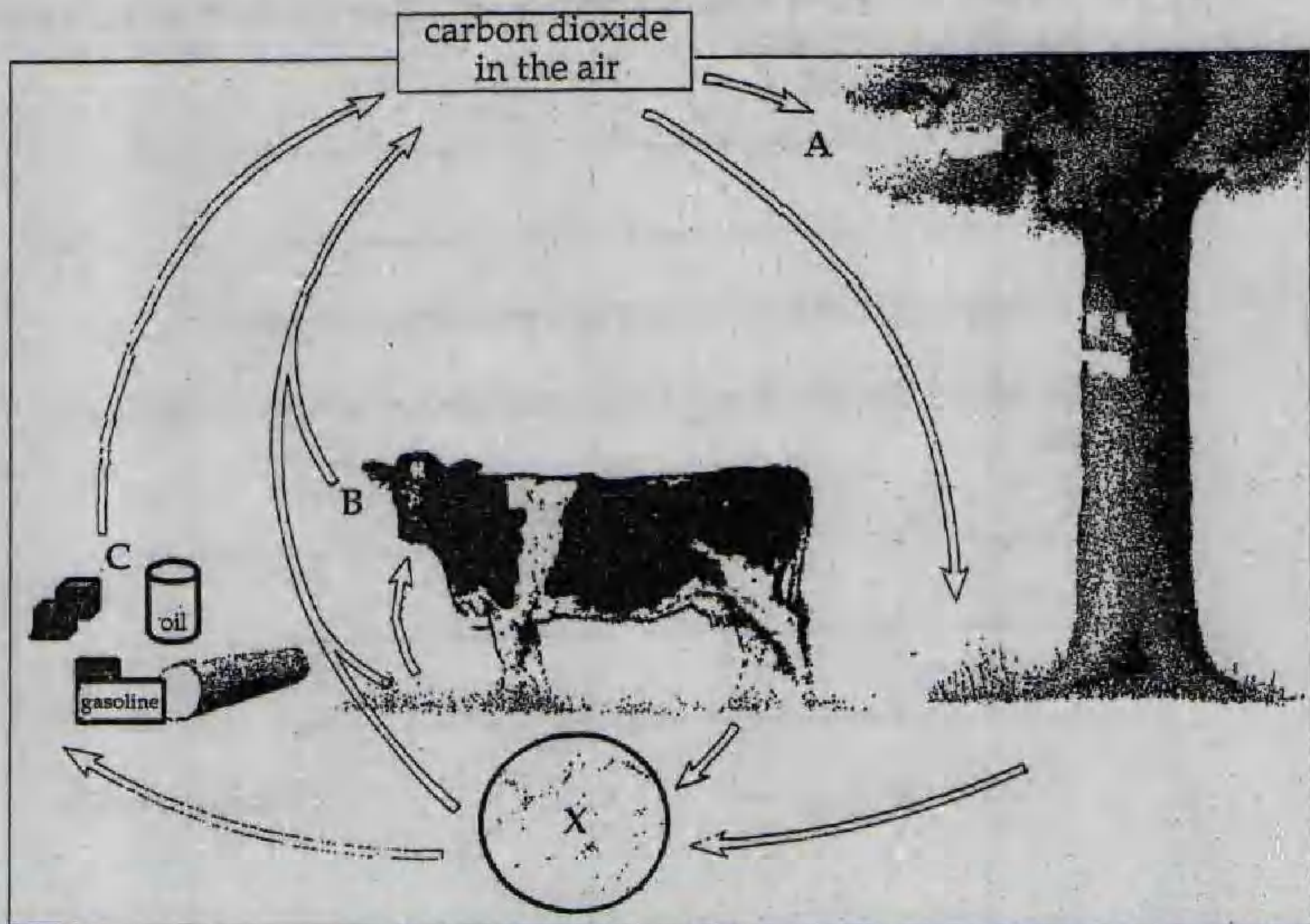
(d) Name the type of energy found in the

(i) waterfall _____

(ii) water behind the dam _____ [2]

Total marks [10]

5. The diagram represents the carbon cycle.



- (a) Fill in the blanks with the processes occurring at A, B and C to complete the diagram.

A _____

B _____

C _____

[3]

- (b) The part labelled X on the diagram represents decomposers.

- (i) Describe the function of a decomposer.

[2]

- (ii) Give ONE example of a decomposer.

[1]

- (c) The percentage of carbon dioxide gas in the atmosphere is fairly constant.

Explain how processes A and B help to maintain this level of carbon dioxide in the atmosphere.

_____ [2]

- (d) The gas carbon monoxide can also be a product of process C.

Explain why, if this gas is inhaled in sufficient quantities, it can result in death.

_____ [2]

Total marks [10]

6. Both aluminium and copper are very useful metals.

(a) Give **TWO** physical properties of all metals.

[2]

(b) Bauxite is an ore of aluminium.

(i) Define the word **ore**.

[1]

(ii) State **ONE** Caribbean island known for its bauxite mines.

[1]

(c) A common alloy of aluminium is duralumin, which is used in the manufacture of aircraft.

(i) Define the term **alloy**.

[1]

(ii) Give **ONE** reason why an aluminium alloy is used in the manufacture of aircraft instead of pure aluminium.

[1]

(d) The word equation summarizes how copper is extracted from one of its ores.

copper(I) sulphide + oxygen $\longrightarrow$ copper + sulphur dioxide

(i) Name the reactants.

[1]

- (ii) Explain why this reaction is an example of an oxidation reaction.

_____ [1]

- (iii) Give **ONE** use of copper.

_____ [1]

- (e) State **ONE** harmful consequence of mining metal ores.

_____ [1]

Total marks [10]

7. The table shows the mass composition of a meal.

types of food	food (g)
chicken breast	80
dinner roll	10
french fries	50
lettuce and tomatoes	20
water	100

- (a) Calculate the total mass of the meal eaten.

[1]

- (b) Determine what percentage of the total meal is the chicken.

[1]

- (c) (i) State the main nutrient provided by the chicken.

[1]

- (ii) Explain how this nutrient is digested and used by the body.

[2]

(d) Although fibre cannot be digested to be absorbed by the body it is still considered an essential part of the diet.

(i) Name an item in the meal which contains the most fibre.

_____ [1]

(ii) Explain how a diet which is low in fibre can affect a person's health.

_____ [2]

(e) State whether this is a nutritionally balanced or unbalanced meal, giving a reason for your answer.

kind of meal _____

reason _____

_____ [2]

Total marks [10]

8. The mass and weight of an object are related by the equation

$$\text{weight} = \text{mass} \times g$$

value for g on Earth = 10 N/kg , value for g on the Moon = 1.6 N/kg

- (a) State **TWO** differences between mass and weight.

[2]

- (b) A bust of Sir Milo B. Butler has a mass of 200 kg on the Earth.

- (i) Calculate its weight.

[1]

- (ii) Determine the mass of this bust if it were placed on the Moon

[1]

- (iii) Calculate the weight of this bust if it were placed on the Moon.

[1]

(d) kinetic energy depends on speed and mass.

(i) Define kinetic energy.

_____ [1]

(ii) Can the kinetic energy of a body be negative?
Explain your answer.

_____ [2]

(iii) A ceiling tile fell in a science laboratory.

State its potential energy halfway to the floor.

State its kinetic energy halfway to the floor.

_____ [2]

Total marks [10]

School Number	Candidate Number
Surname and Initials	

COMBINED SCIENCE

PAPER 3 3102/3

Wednesday **7 JUNE 2006** 12.30 – 2.00 P.M.

Additional materials:

Answer Booklet for Section B

Graph paper

MINISTRY OF EDUCATION NATIONAL EXAMINATIONS

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS AND INFORMATION FOR CANDIDATES

Do not open this booklet until you are told to do so.

Write your school number, candidate number, surname and initials in the spaces provided above and on the answer booklet.

Answer ALL questions in Section A (1–4) in the spaces provided.

Answer ANY two (2) out of three (3) questions from Section B in the answer booklet provided which must be attached to the back of the question booklet.

Candidates are advised to spend no more than 35 minutes on Section A.

The number of marks is given in brackets [] at the end of each question or part question.

A copy of the Periodic Table is printed on page 2.

Calculators are permitted, however NO graphing calculators are allowed.

For Examiner's Use	
SECTION A	
1	
2	
3	
4	
SECTION B	
5	
6	
7	
TOTAL	

This question paper consists of 14 printed pages and 2 blank pages.

hydrogen 1 H 1.00794												helium 2 He 4.002602			
lithium 3 Li 6.941		beryllium 4 Be 9.0122													
sodium 11 Na 22.990		magnesium 12 Mg 24.305													
potassium 19 K 39.098		calcium 20 Ca 40.078													
rubidium 37 Rb 85.468		strontium 38 Sr 87.62													
caesium 55 Cs 132.91		barium 56 Ba 137.33		57-70 *											
francium 87 Fr 223		radium 88 Ra 226		89-102 * *											

* Lanthanide series

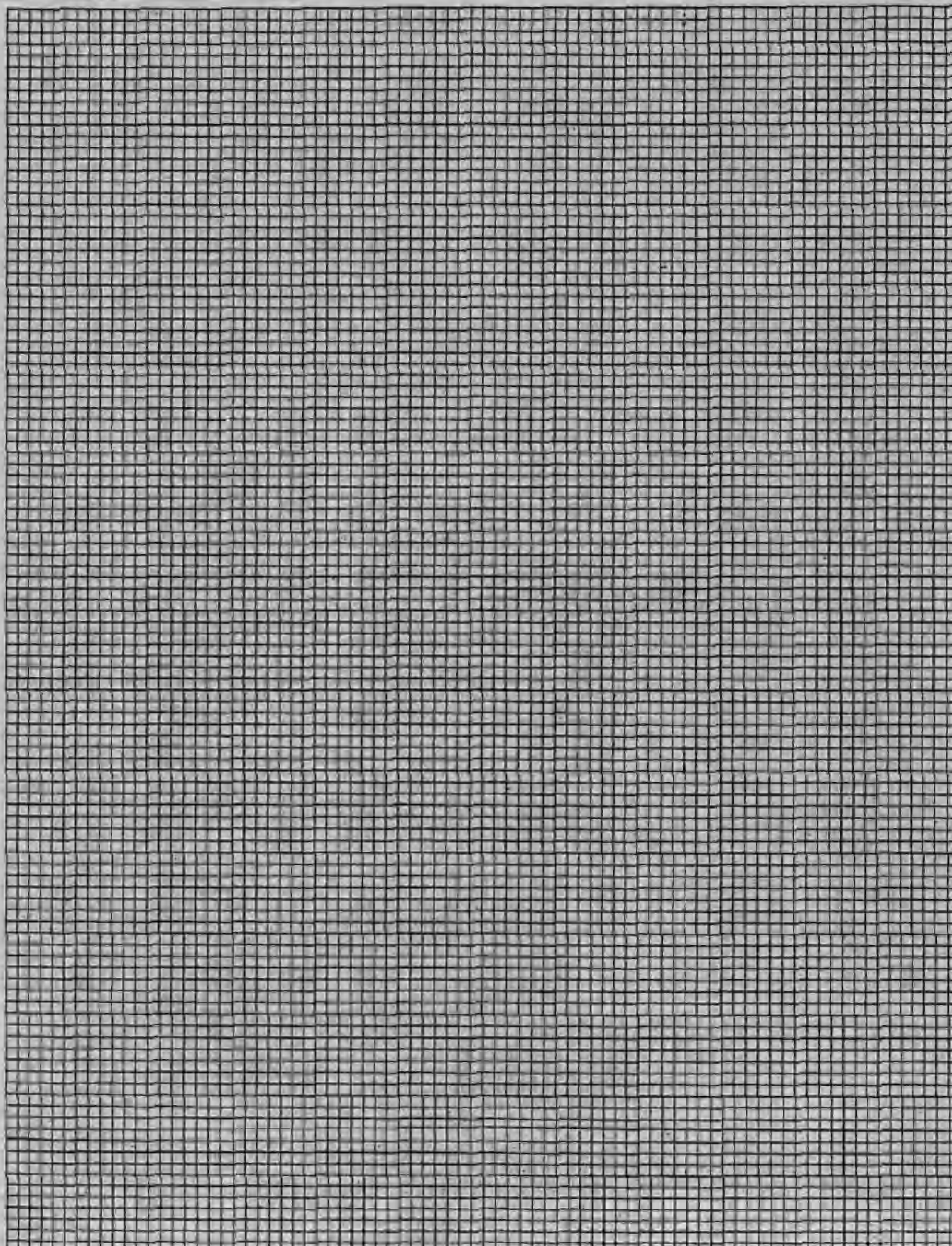
* Actinide series

lanthanum 57 La [138.91]	cerium 58 Ce [140.12]	praseodymium 59 Pr [140.91]	neodymium 60 Nd [144.24]	promethium 61 Pm [145]	samarium 62 Sm [150.36]	europium 63 Eu [151.96]	gadolinium 64 Gd [157.25]	terbium 65 Tb [158.93]	dysprosium 66 Dy [162.50]	holmium 67 Ho [164.93]	erbium 68 Er [167.26]	thulium 69 Tm [168.93]	ytterbium 70 Yb [173.04]
actinium 89 Ac [227]	thorium 90 Th [232.04]	protactinium 91 Pa [231.04]	uranium 92 U [238.03]	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

MINISTRY OF EDUCATION
BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION

AB7

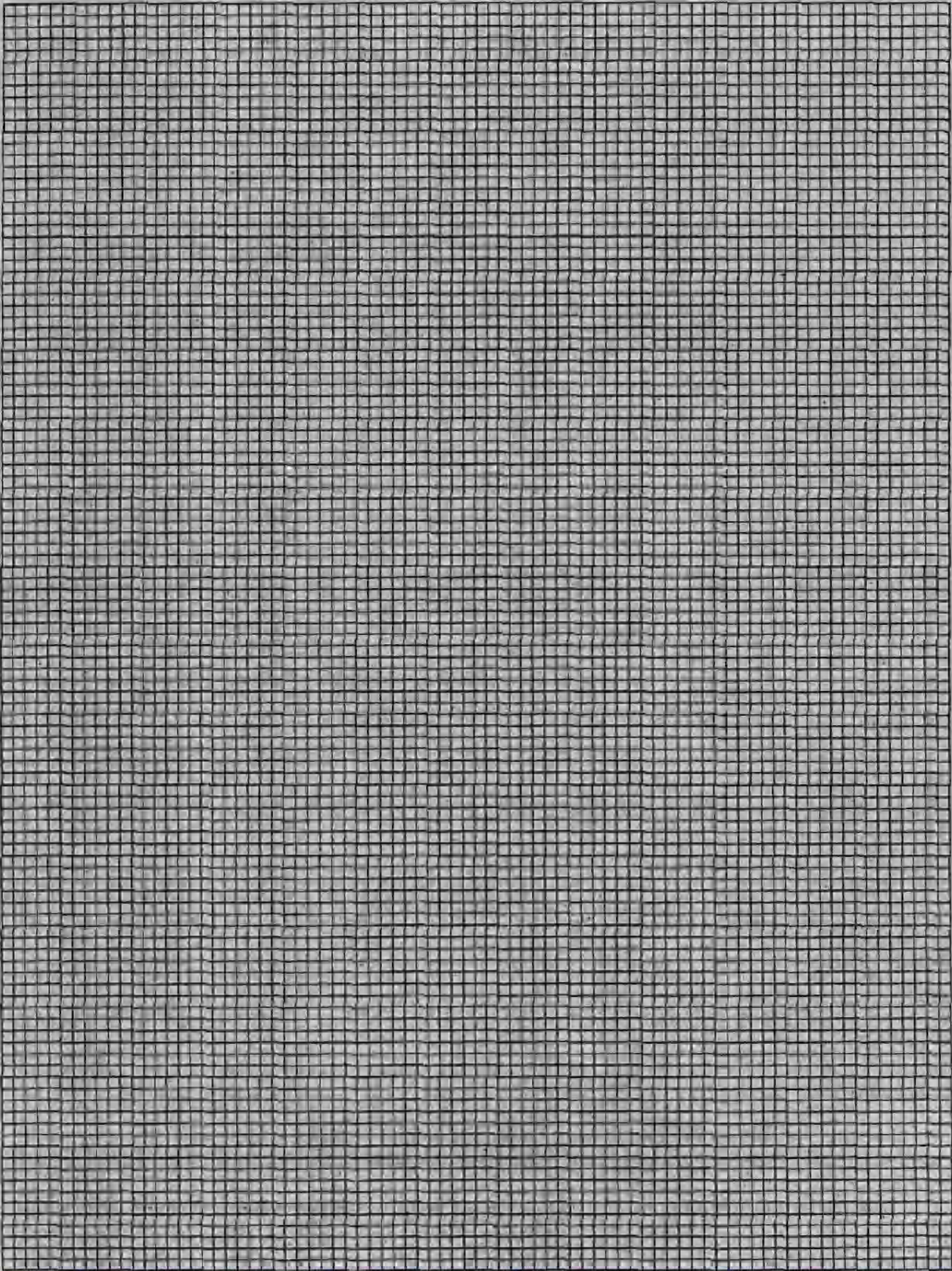
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Subject Number & Title:		Paper:	
Surname & Initials:		Section:	
Signature:	Date:	Ques. No.	



MINISTRY OF EDUCATION
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EXAMINATION

AB7

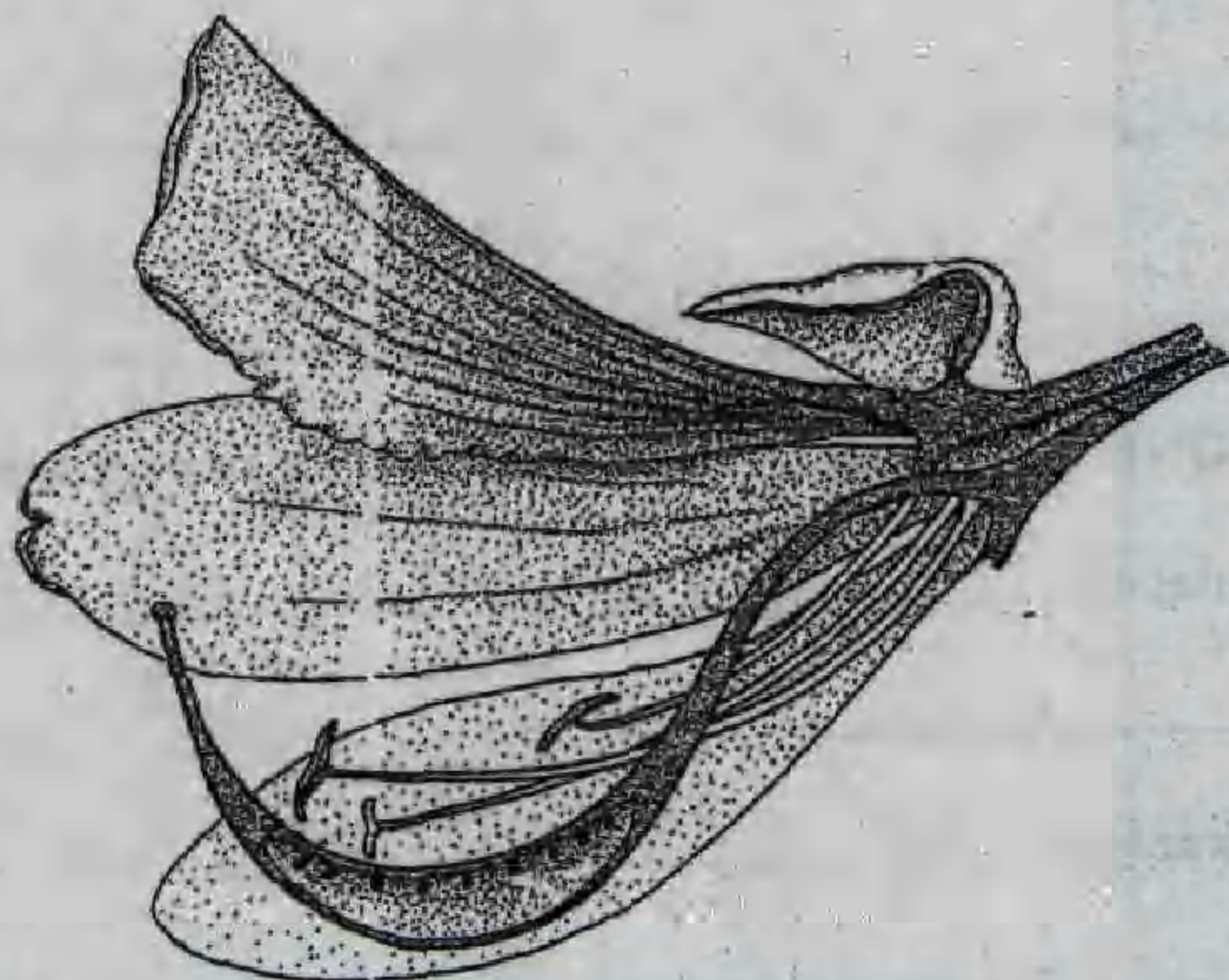
School No.	Candidate No.		For Examiner's Use
Subject Number & Title:		Paper:	
Surname & Initials:		Section:	
Signature:	Date:	Ques. No.	



SECTION A

Answer ALL questions in this section.

1. The diagram shows the reproductive structures in the half-flower *Bauhinia*.



- (a) State the names of the male and female structures of a flower.

female _____ [1]

male _____ [1]

- (b) (i) Name the method of pollination for this flower.

_____ [1]

- (ii) On the diagram, label a structural adaptation which suggests how this flower is pollinated. [1]

- (iii) Briefly describe this labelled structural adaptation and its role in pollination.

description _____ [1]

role _____ [1]

- (c) Wind-pollinated flowers have structural features which are different to insect-pollinated flowers.

Name TWO structures and describe how they differ in these two types of flower. Write your answers in the table. [2]

name of structure	insect-pollinated	wind-pollinated

- (d) Give ONE advantage and ONE disadvantage of sexual reproduction

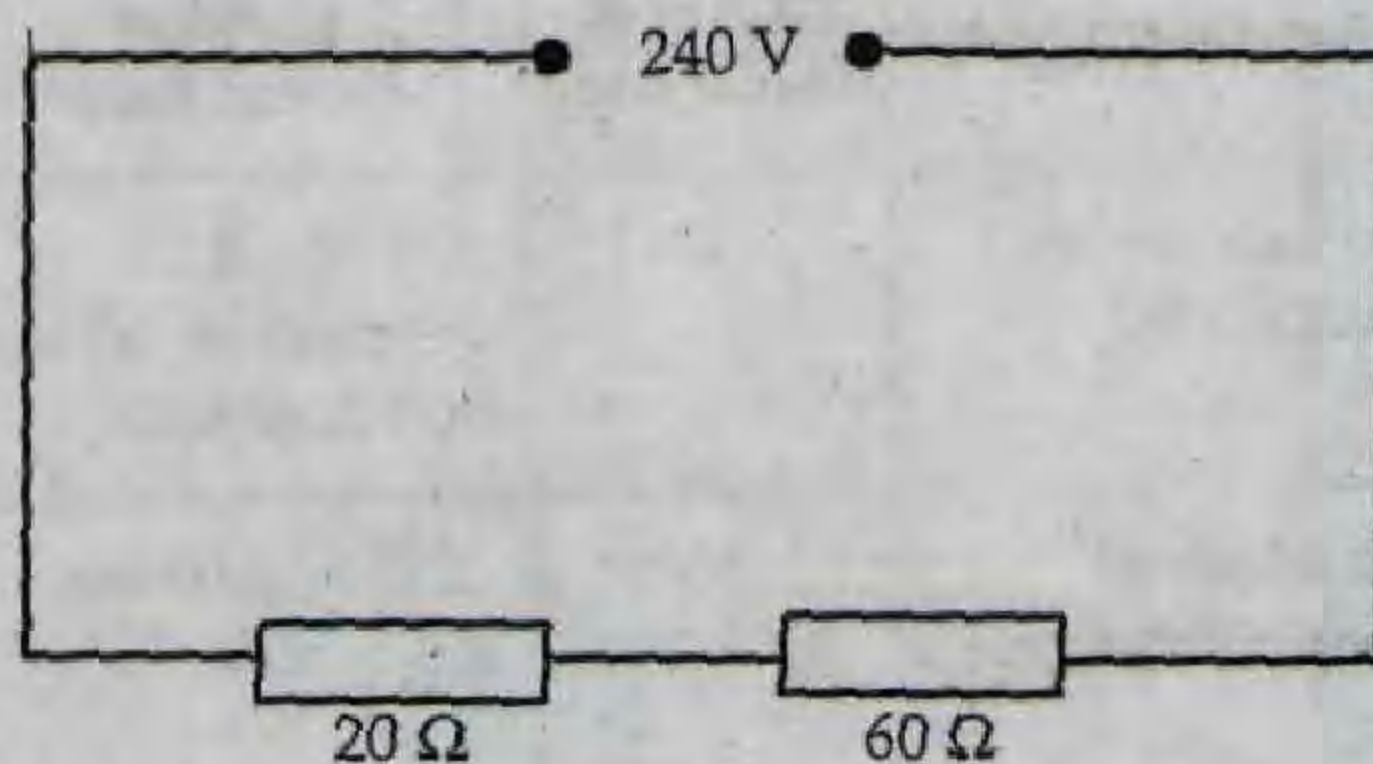
advantage _____

disadvantage _____

[2]

Total marks [10]

2. The circuit shows two electric heaters connected to a 240 volt supply.



- (a) Draw and correctly connect in the circuit the symbols for
- (i) the instrument used to measure current in the circuit. [2]
 - (ii) the instrument used to measure voltage in the circuit. [2]
- (b) Assuming the power supply has no resistance, calculate showing working and units
- (i) the total resistance of the circuit, [1]
 - (ii) the current in the circuit. [2]
- (c) If the current is switched on for 2 minutes and 20 seconds, calculate how much charge will flow through the circuit. [3]

Total mark [10]

3. Two different samples of rain water A and B were collected and tests were carried out on both samples. The results are shown in the table.

sample	where collected	drops of liquid soap	effect of liquid soap	after evaporation
A	pure rain water from the sky	2	rich, thick permanent lather, no scum seen	no solids seen
B	after passing through limestone rock	10	cloudy mixture, scum seen	solids seen

- (a) State which sample shows hardness and give **ONE** reason for your choice.

_____ [1]

- (b) Name a possible solid formed after the evaporation of sample B.

_____ [1]

- (c) Write a balanced symbolic equation to show how the solid was formed after the evaporation of sample B.

[2]

- (d) State which sample is better for doing laundry. Give **TWO** reasons for your choice.

sample _____

1 _____

2 _____ [1]

- (e) State which sample has health-related benefits and give **TWO** health-related benefits of using this sample for drinking.

sample _____

1 _____

2 _____ [1]

The table shows how water is used in our homes.

uses	volume used per person per day (L)
bathing	50
cooking	10
drinking	3
flushing toilets	40
gardening	12
laundry	20
washing dishes	15

(f) Assume that an average household has 4 persons.

(i) Calculate the total volume of water used by an average household.

[1]

(ii) State what percentage of the total volume of water used in an average household is used for flushing toilets.

[2]

(g) Hard water is often softened before it is used in our homes.

Name ONE method other than boiling by which water can be softened.

[1]

Total marks [10]

4. Enzymes are an example of biological catalysts. They are **substrate specific** in their action.

(a) State why enzymes are said to be **substrate specific** in their action.

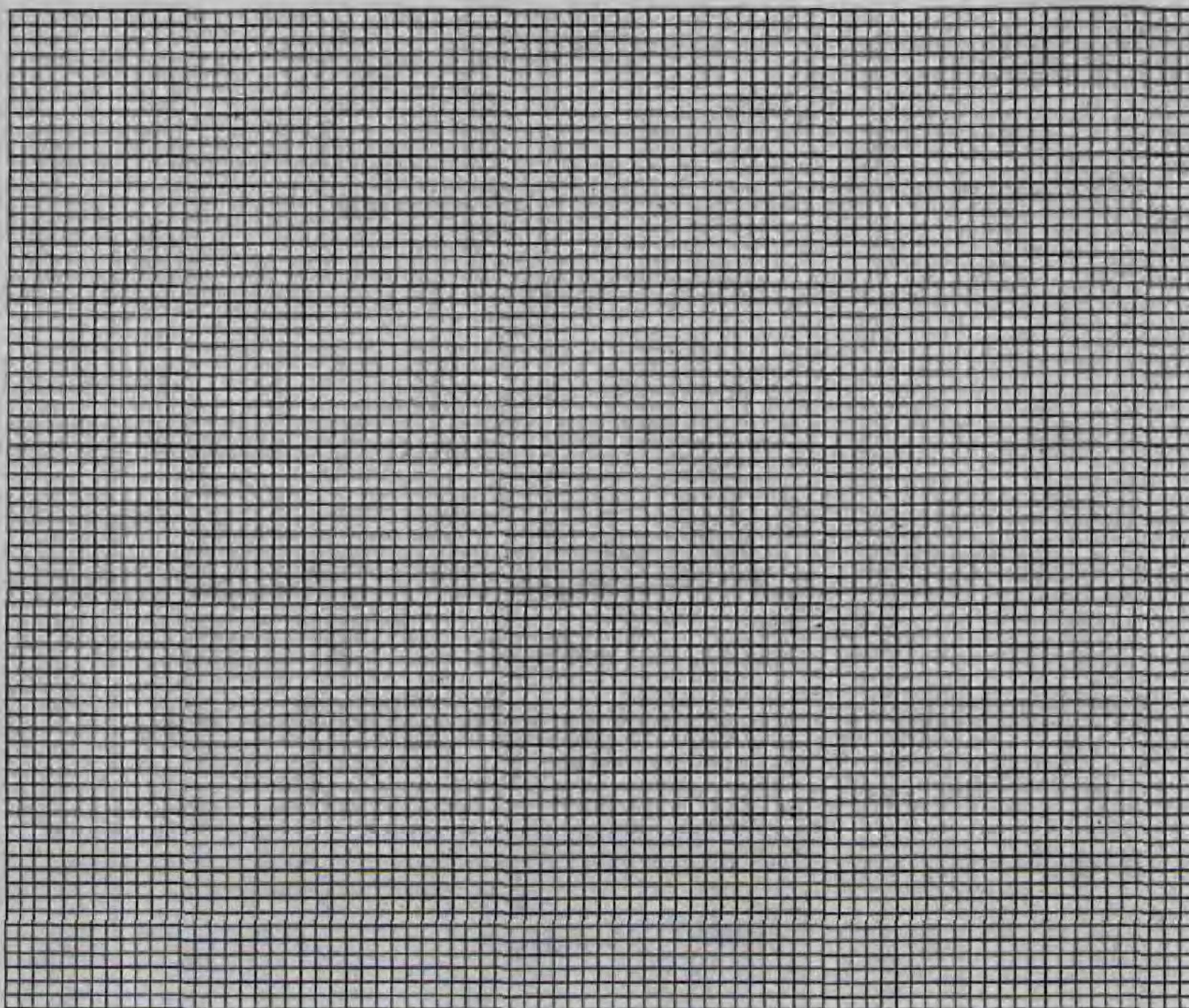
 [1]

- (b) An experiment was carried out using a protease enzyme extracted from a microbe found living in the hot water springs of a volcanic region in Hawaii.

The initial concentration of the enzyme and substrate were kept constant and these results were obtained from the investigation.

temperature (°C)	rate of reaction (mg of product / time)
0	0
10	0.5
20	0.9
30	1.4
40	2.0
50	2.7
60	3.3
70	3.6
80	2.3
90	0.9
100	0

- (i) Plot a suitable line graph of the data. Use the x-axis to plot the temperature.



[5]

- (ii) Explain why the rate of product formation drops to 0 at 100°C.

[2]

- (iii) The same experiment was carried out a second time using half the original amount of substrate as in the first investigation.

Sketch on the same graph a dotted line to indicate the possible pattern for the results obtained from the second investigation.

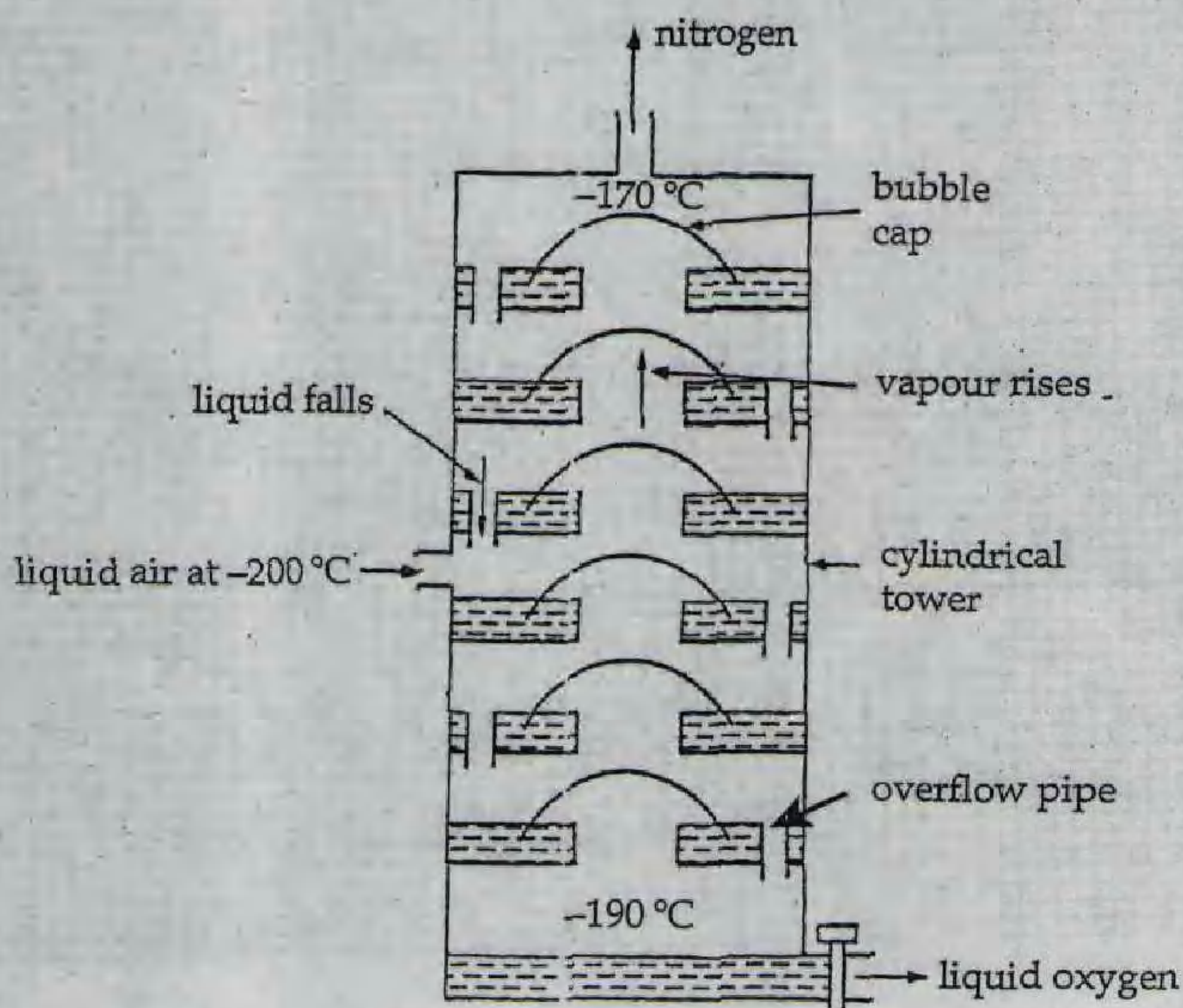
[2]

Total marks [10]

SECTION B

You are required to answer any **TWO** out of the three questions. Write your answers in the answer booklet provided.

5. The diagram shows the separation of nitrogen and oxygen.



gas	bp °C
nitrogen	-196 °C
oxygen	-183 °C

- (a) With reference to **nitrogen** only

- (i) name the method of separation shown. [1]
- (ii) explain fully how the nitrogen is obtained. [3]

- (b) State the purpose of the bubble cap. [1]
- (c) Give a reason why the oxygen is separated in a liquid state during this process. [1]
- (d) Nitrogen is often used to replace air in food packaging. Liquid nitrogen is also used as a refrigerant.

Give TWO properties of nitrogen which makes these uses possible. [2]

- (e) Nitrogen is used by the chemical industry to make useful substances. State TWO of these uses. [2]
- (f) Air bags contain the solid sodium azide (NaN_3) which decomposes rapidly on impact.
 - (i) State what happens during a decomposition reaction. [1]
 - (ii) Write the balanced symbolic equation for the decomposition of sodium azide. [2]
 - (iii) Explain why the air bag inflates on impact. [3]
- (g) In the human body oxygen is used for aerobic respiration.
 - (i) Write the balanced symbolic equation for aerobic respiration of glucose. [3]
 - (ii) Give the molecular mass of any ONE of the products from this reaction. [1]

Total marks [20]

6. The human body is able to respond differently to the many different stimuli it encounters.

(a) Define the terms **STIMULUS** and **RESPONSE**. [2]

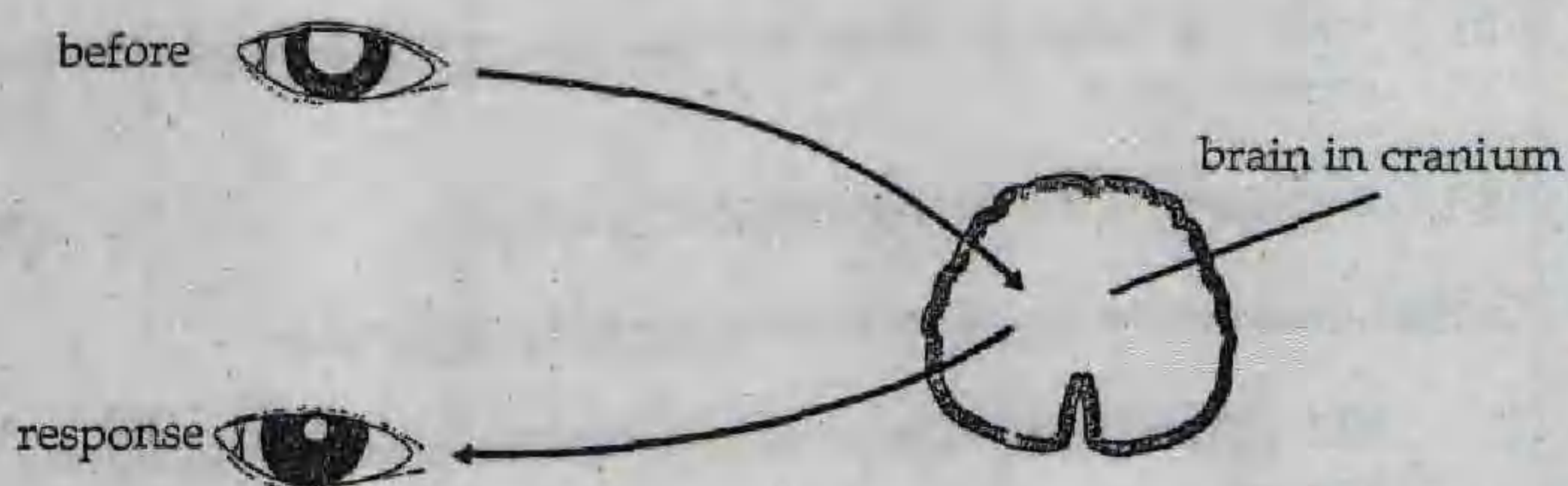
(b) A reflex action is an example of a specific response to a specific stimulus.

State **THREE** other characteristics of a reflex action. [3]

(c) When a child touches a hot object the child's hand will instinctively and rapidly pull away from the hot object.

Describe the pathway of this response through the nervous system, from the time the hot object is touched to how the response is brought about, (You may use a labelled diagram.) [7]

(d) The diagram relates to the pupil reflex.
Khalil walks from a dark theatre into a sunny car park.



(i) Name the specific stimulus for the response shown. [1]

(ii) State the name of the receptors involved in this response. [1]

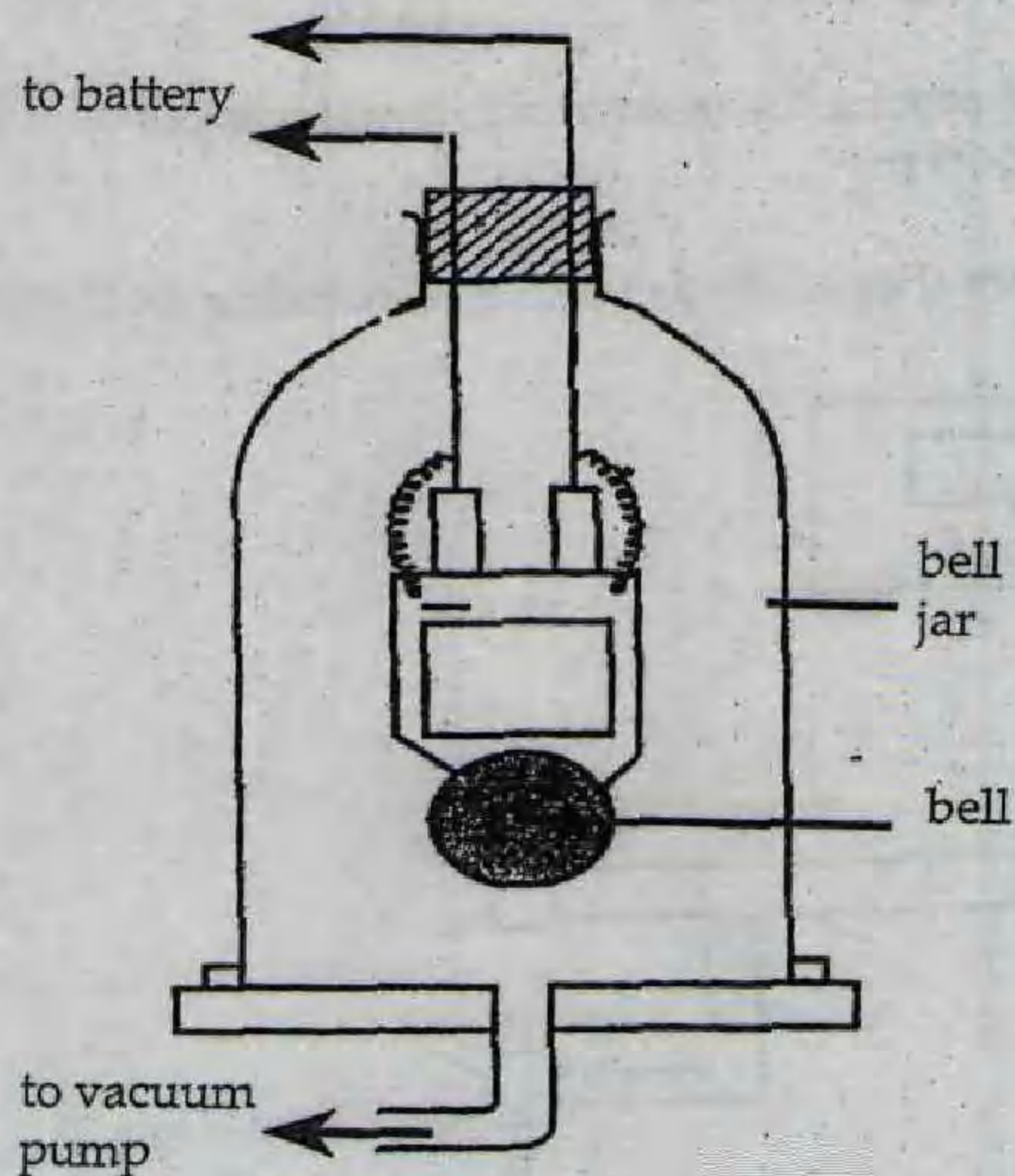
(iii) Explain how the action of the iris muscles brings about this response. [3]

(e) (i) Reflexes are examples of one type of response made by the body. Name a second type of response. [1]

(ii) Give a specific example of this second type of response and explain the key difference between it and a reflex type response. [2]

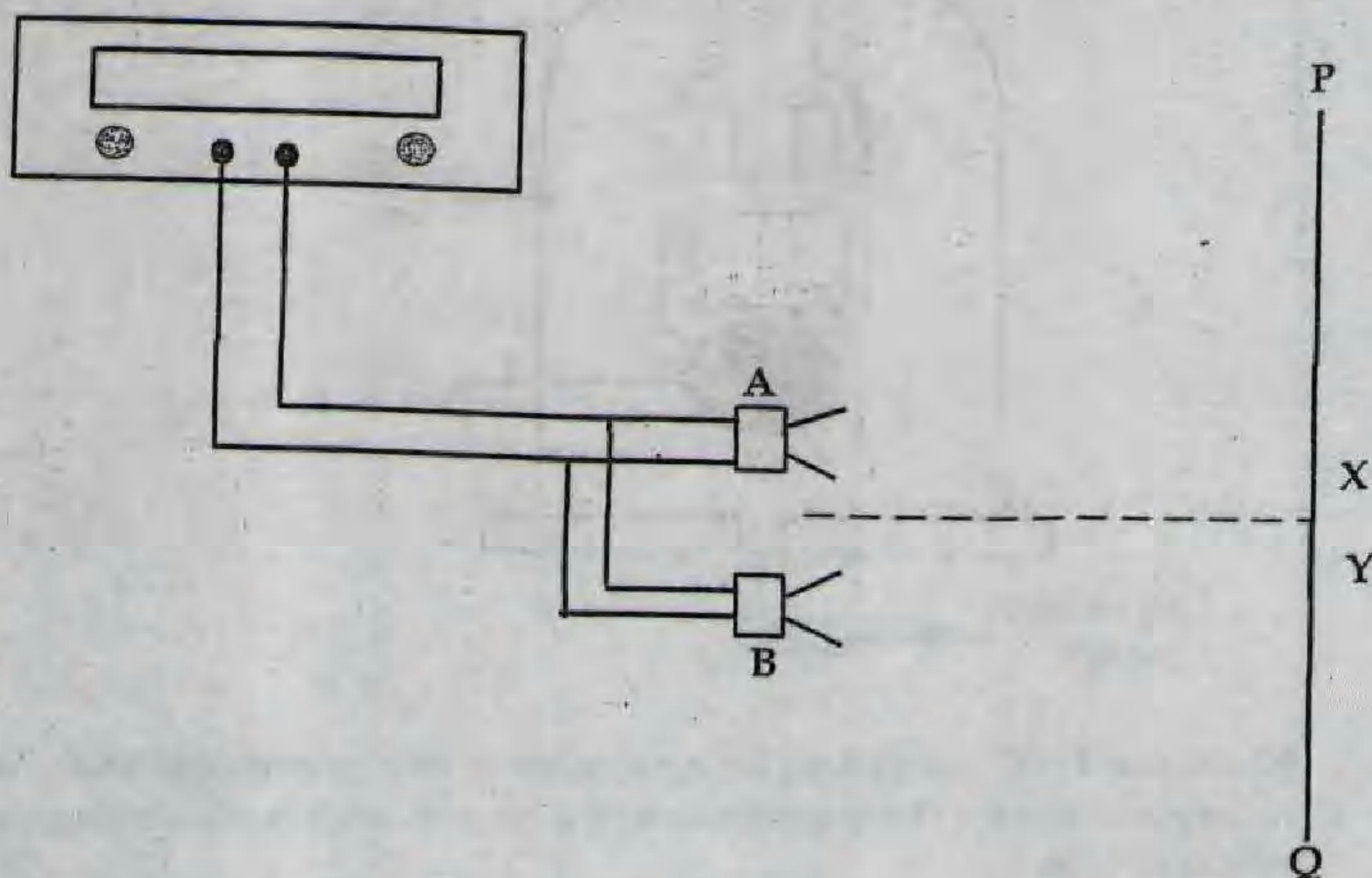
Total marks [20]

7. The apparatus below is used to investigate the transmission of sound. The electric bell is switched on and air is pumped out of the bell jar using a vacuum pump.



- (a) Name the TWO conditions being studied in this experiment and give an explanation for the transmission of sound in both media during the ringing of the bell. [4]
- (b) The speed of sound in air is 340 m/s . Determine the wave length of a sound of frequency 200 Hz , being transmitted from the bell. [3]

- (c) A ship using an echo-sounding device, receives an echo from a wreck 0.65 s after the sound is transmitted. (Show all working for calculations.)
- (i) If the velocity of sound in sea-water is 1 500 m/s, determine the depth of the wreck. [3]
- (ii) Determine the frequency of the transmission if the wave length is 0.25 m. [3]
- (iii) State the property of sound responsible for the echo. [1]



The diagram shows two loudspeakers, A and B, connected to the same signal generator. Both speakers emit equally loud sounds of the same frequency.

The loudness of the combined sound from the two speakers varies along the line PQ. It is very loud at Y but very quiet at X.

- (d) Explain, with the aid of diagrams why this variation in loudness occurs. [6]

Total marks [20]