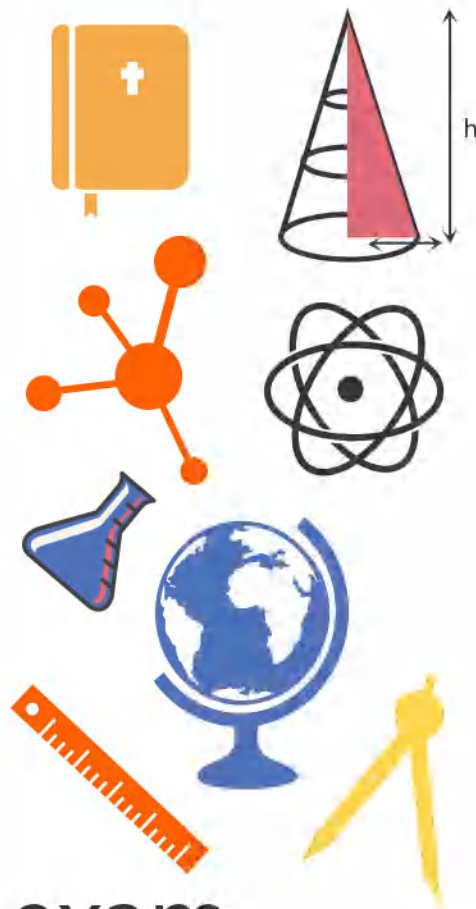


student **BGCSE** exam
Past Paper Booklet
Combined
Science



For more help preparing for BJC or BGCSE visit
www.TheStudentShed.com



DISCLAIMER

This document consist of scanned copies of the BGCSE and/or BJC past papers produced by the Bahamas Ministry of Education. The Student Shed accepts no responsibility or liability for the contents within this document, including but not limited to; answers that may be highlighted, missing papers or missing questions.

It is the sole responsibility of the user to determine the correct and most suitable answers for each question contained therein.

3102/1

BGCSE

School Number	Candidate Number
Surname and Initials	

COMBINED SCIENCE

PAPER 1 3102/1

Tuesday **29 MAY 2018** 12:00 NOON–1:15 P.M.

No additional materials required.

**MINISTRY OF EDUCATION
NATIONAL EXAMINATIONS**

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

INSTRUCTIONS 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 on this question booklet.

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 of your choice in the booklet.

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

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

FOR EXAMINER'S USE ONLY	
Total Marks	



This question paper consists of 23 printed pages and 1 blank page.



The Periodic Table of the Elements

Group																																																																																																			
I	II	III	IV	V	VI	VII	0																																																																																												
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86	226 Ra Radium 88	227 Ac Actinium 89	232 Th Thorium 90	232 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71

* 58-71 Lanthanoid series
 † 90-103 Actinoid series

Key

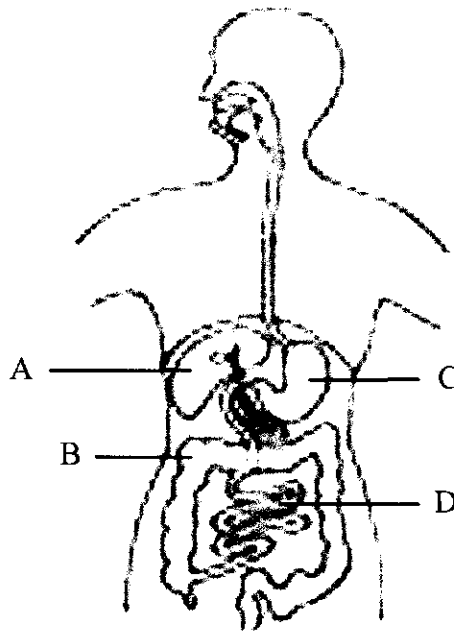
^a	X
b	

a = relative atomic mass
 X = atomic symbol
 b = proton (atomic) number

1. In which part of the Periodic Table is the element krypton?

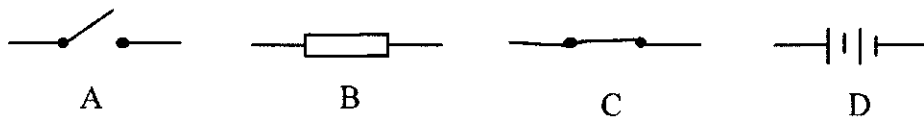
- A. alkali earth metals
- B. alkali metals
- C. noble gases
- D. transition metals

2. The diagram shows four organs of the digestive system.



Which of the structures A, B, C or D contains villi?

3. Which symbol represents a closed switch?

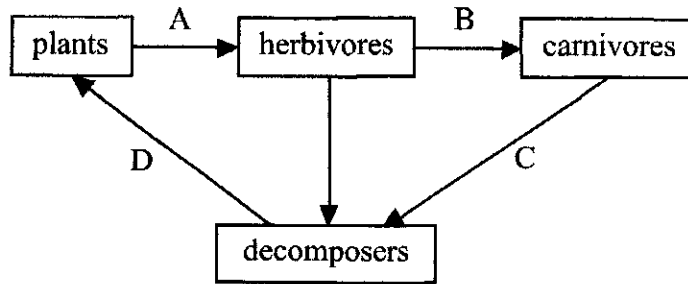


4. What term describes animals that are hunted for food by other animals?

- A. decomposers
- B. predators
- C. prey
- D. scavengers

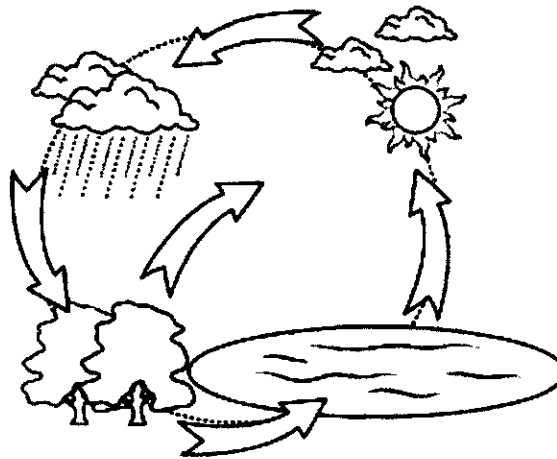


5. The diagram shows the energy flow in a food web.



Which arrow does **NOT** show the direction of energy flow?

6. The diagram shows the main structures of a flowering plant.

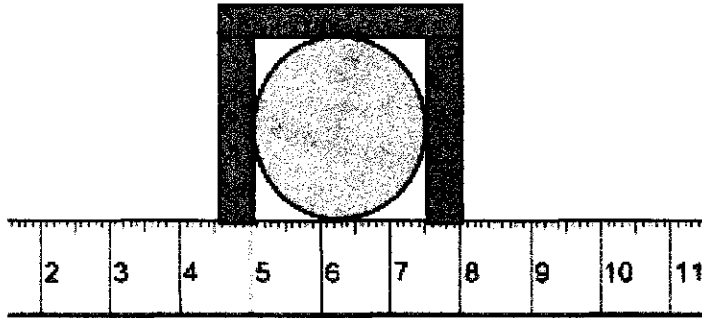


Which **TWO** processes are taking place at Y and Z?

	Y	Z
A.	condensation	precipitation
B.	evaporation	transpiration
C.	transpiration	evaporation
D.	precipitation	condensation

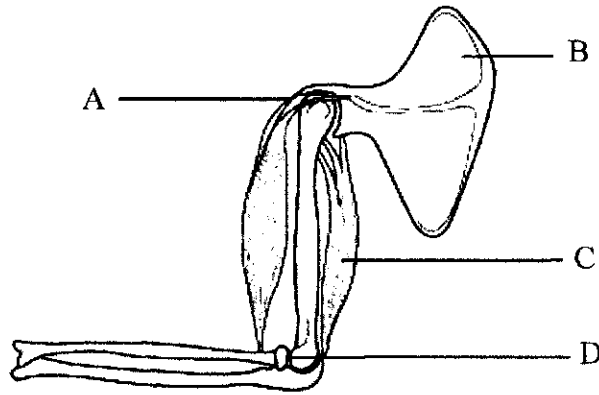


7. The diagram shows one way of measuring the diameter of a ball.



What is the diameter of the ball?

- A. 1.25 cm
 - B. 1.75 cm
 - C. 2.50 cm
 - D. 3.50 cm
8. The diagram shows the structures in the human arm.



Which structure shows an effector?



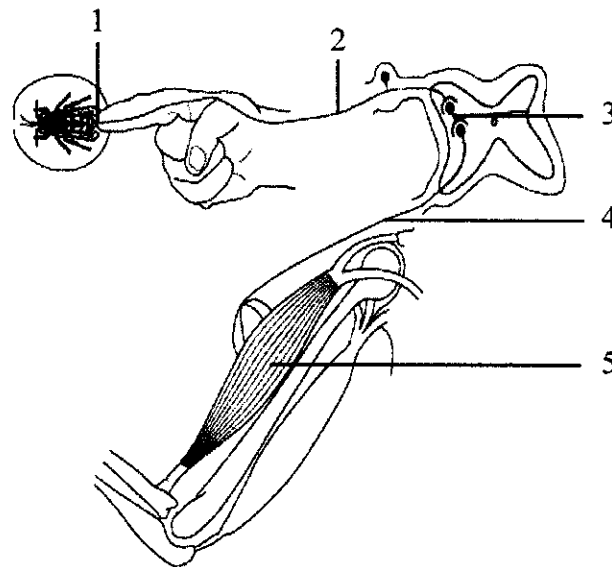
9. The diagram shows a sensory neurone.



What would happen if the myelin sheath was removed?

- A. the impulse would travel faster
- B. the impulse would travel slower
- C. the impulse would travel in the opposite direction
- D. the impulse would not be received

10. The diagram represent a reflex arc.



Which row shows the path of the impulse from the fingertip to the muscle in the arm?

	1	2	3	4	5
A.	effector	motor nerve	relay nerve	sensory nerve	receptor
B.	receptor	sensory nerve	relay nerve	motor nerve	effector
C.	sensory nerve	receptor	relay nerve	effector	motor nerve
D.	receptor	effector	relay nerve	motor nerve	sensory nerve



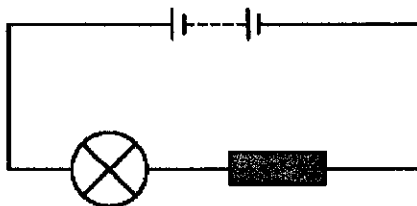
11. Why is this reaction a chemical change?



- A. a new substance is formed
- B. light is produced
- C. oxygen is present in the air
- D. there is no change in the mass of magnesium

12. An unknown element is tested using the apparatus shown. The lamp did **NOT** light up.

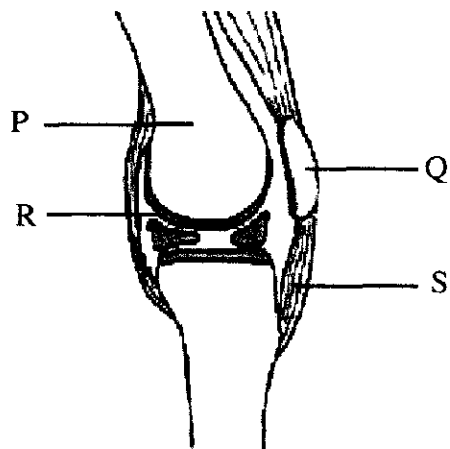
Which statement could describe the element?



- A. a Group 1 metal
- B. an alloy
- C. a non-metal
- D. a transition element



Questions 13 and 14 relates to the diagram which shows a side view of the structures in the knee.



13. Which two structures work with antagonistic muscles to cause movement?

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

14. Which structure protects the ends of bones where they meet to form a joint?

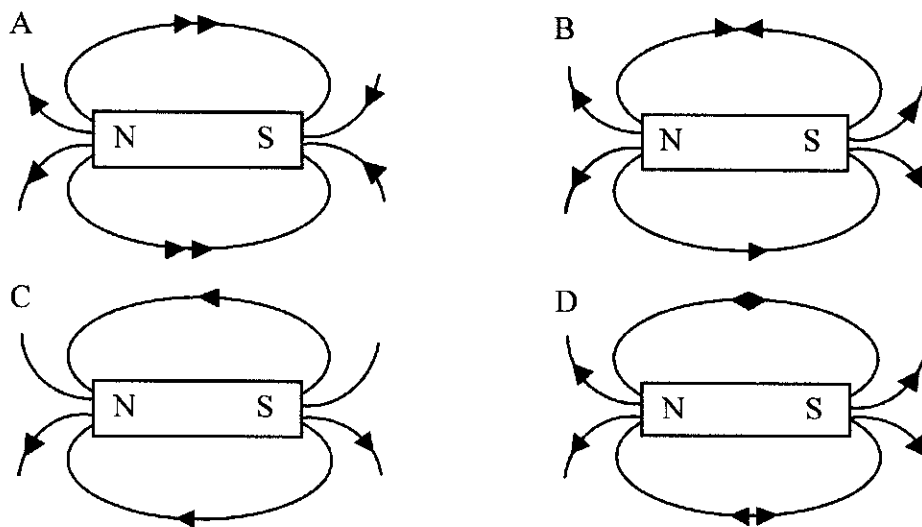
- A. P
- B. Q
- C. R
- D. S

15. Which element is a metalloid?

- A. chromium
- B. germanium
- C. manganese
- D. sulphur



16. Which diagram shows the magnetic field for a bar magnet.



17. Which row matches the hormone with its function?

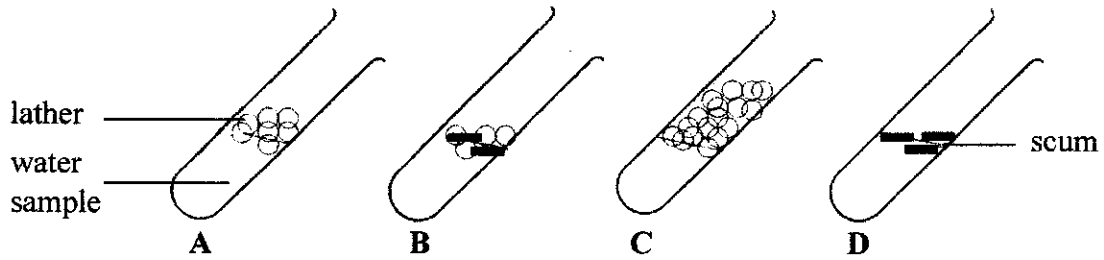
	hormone	body part affected	result
A.	oestrogen	breast	increase in milk production
B.	oestrogen	hip girdle	increase in ova growth
C.	testosterone	face	increase in hair growth
D.	testosterone	penis	increase in sperm production

18. Which structure does **NOT** match its function?

	structure	function
A.	cervix	opening of the uterus into the vagina
B.	placenta	forms a protective fluid-filled sac around the developing foetus
C.	umbilical cord	connects the foetus to the placenta
D.	uterus	where foetus develops

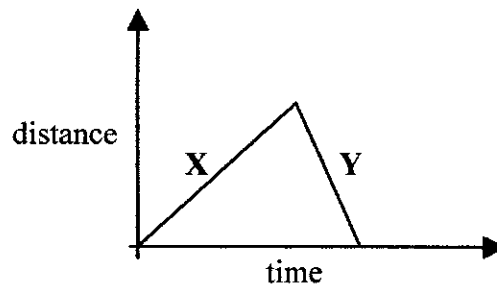


19. Five drops of soap solution are added to equal volumes of different samples of water. The **four** test tubes were shaken and the results obtained shown.



Which test tube contains the softest water?

20. The distance against time graph shows the motion of a car.



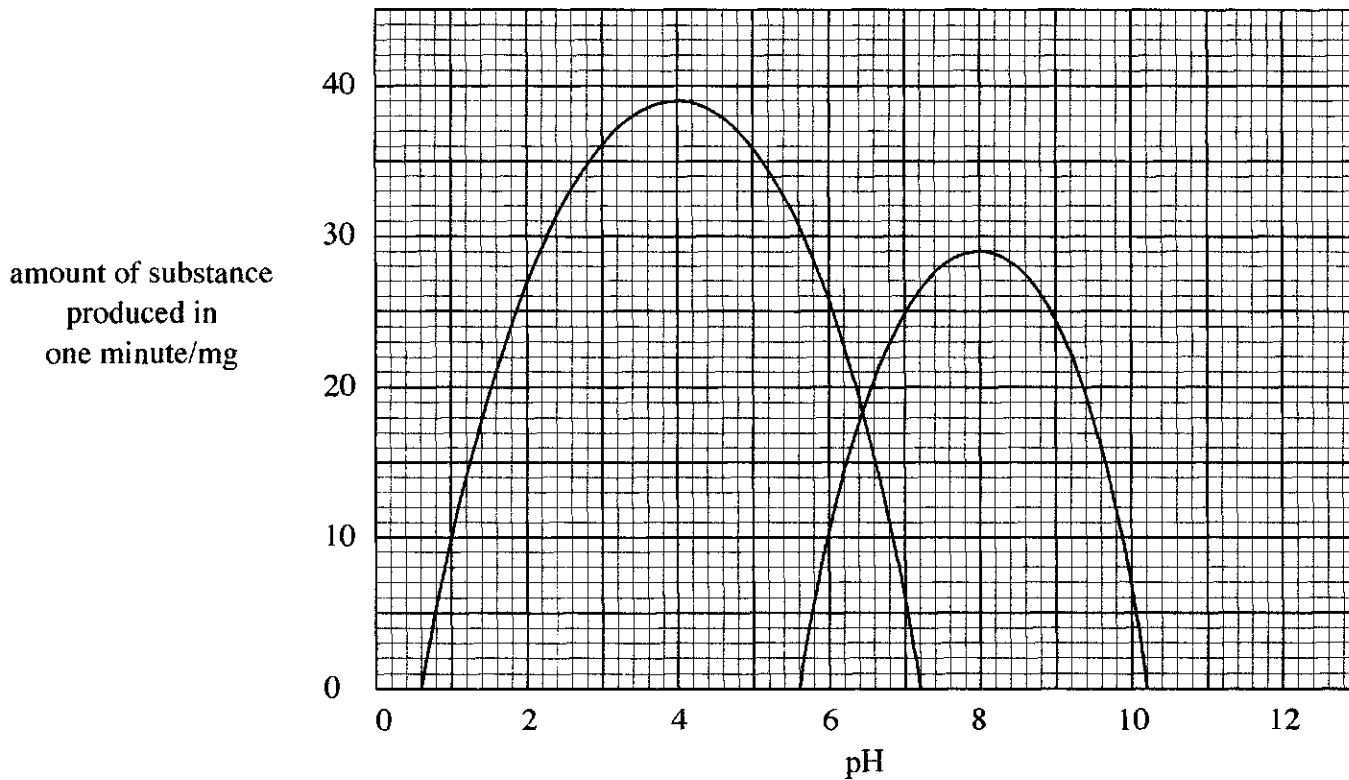
Which row describes the speed of the car in section X and section Y of the graph?

	speed in section X	speed in section Y
A.	constant	constant
B.	constant	decreasing
C.	increasing	constant
D.	increasing	decreasing



21. The graph shows the effect of different pH on two enzymes.

What is the total amount of substance produced at the optimum pH of both enzymes?



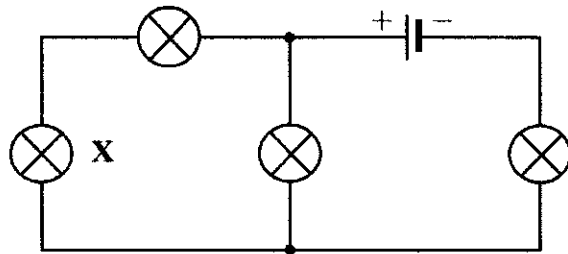
- A. 16.5 mg
- B. 29.0 mg
- C. 39.5 mg
- D. 68.5 mg

22. Which element is a liquid at room temperature and produces a brown gas when warmed?

- A. bromine
- B. chlorine
- C. mercury
- D. neon



23. The diagram shows a circuit in which all the lamps are lit. The lamp marked X blows and breaks part of the circuit.



How many lamps will remain on?

- A. 0
 - B. 1
 - C. 2
 - D. 3
24. The diagram shows a tooth. Six year old Lisa is missing all of her teeth like the one shown.

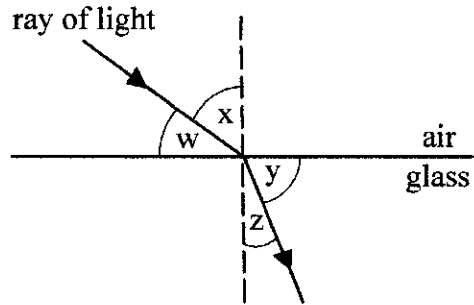


Which problem will she experience when eating?

- A. difficulty biting off pieces of food
 - B. difficulty chewing her food
 - C. difficulty grinding food into tiny pieces
 - D. difficulty swallowing pieces of food
25. Which of the following explains why many covalent compounds have relatively low melting and boiling points?
- A. the bonding between the ions is very weak.
 - B. the bonding between the ions is very strong.
 - C. the bonding between the atoms in the molecules is strong.
 - D. the bonding between the molecules is weak.



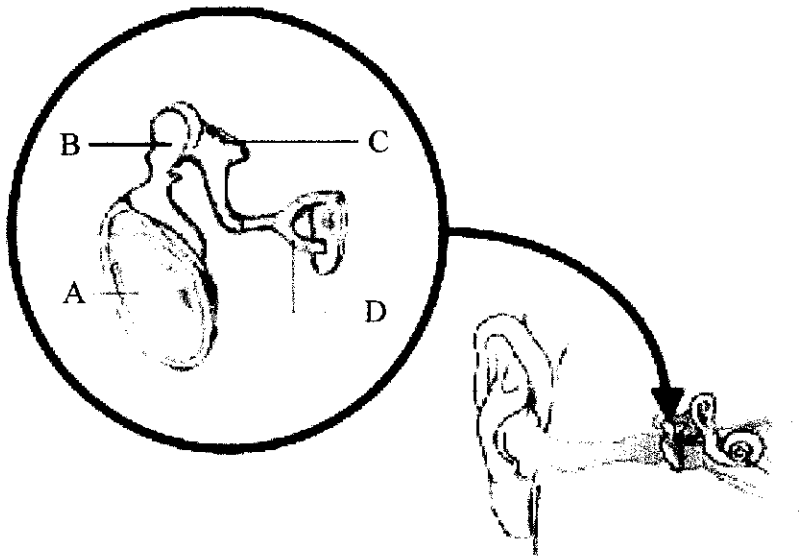
26. The diagram shows a ray of light passing from air into glass.



Which labelled angles are the angle of incidence and the angle of refraction?

	angle of incidence	angle of refraction
A.	w	y
B.	w	z
C.	x	y
D.	x	z

27. The diagram shows structures in the middle ear.



Which letter represents the malleus?



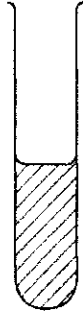
28. Which of these is **NOT** a solution?

dilute sulfuric acid

distilled water

iced tea

sea water



A



B

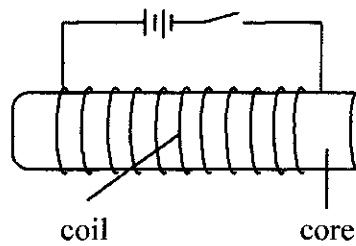


C



D

29. The diagram shows an electromagnet.



The strength of an electromagnet may be increased by

1. increasing the current
2. increasing the number of turns in the coil
3. increasing the diameter of the coils

How could you increase the strength of the electromagnet shown?

- A. 1 and 2
- B. 1 and 3
- C. 2 and 3
- D. 1, 2 and 3



30. Urea is produced in one organ; filtered from the blood by a second organ and stored in a third organ before it is expelled from the body.

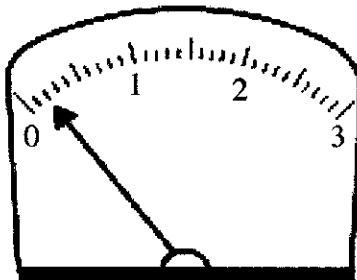
Which organs are responsible for carrying out these functions?

	production	filtration	storage
A.	kidney	bladder	liver
B.	kidney	liver	bladder
C.	liver	bladder	kidney
D.	liver	kidney	bladder

31. Which method removes hardness from water?

- A. boiling
- B. centrifuging
- C. distillation
- D. filtration

32. The diagram shows an ammeter measuring the current in a circuit.



What is the current reading in the circuit?

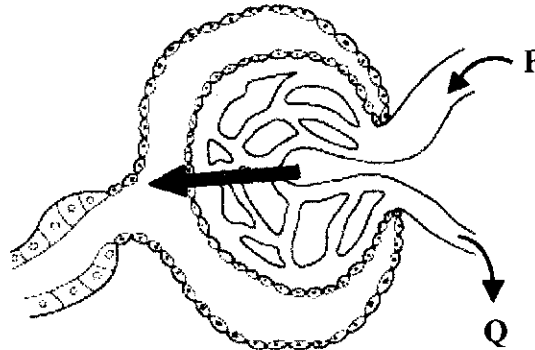
- A. 0.002A
- B. 0.02A
- C. 0.2A
- D. 2.0A



33. Which of the following has a definite volume and an indefinite shape when measured at room temperature?

- A. 5 g chloride
- B. 15 g ethanol
- C. 25 g air
- D. 70 g iron

34. The diagram shows a portion of a nephron showing blood entering the capillary at P and leaving at Q.



Which amount of substance in the blood remains the same at P and Q?

- A. glucose
- B. protein
- C. urea
- D. water

35. The table shows the amount of water and salt lost from the kidneys and the skin on a hot day and on a cold day. Food and drink intake are the same on both days.

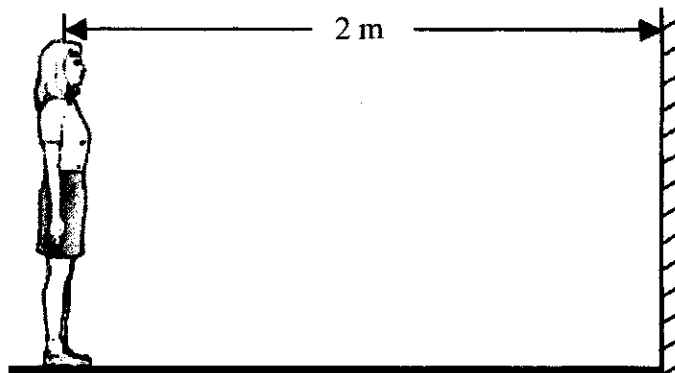
	water loss/dm ³		salt loss/g	
	kidney	skin	kidney	skin
cold day	1.8	0.1	20.3	0.1
hot day	0.4	2.3	20.2	5.8

What do these results show?

- A. less water is lost from the kidneys on a cold day than on a hot day.
- B. more salt is lost from the kidneys on a hot day than on a cold day.
- C. the total amount of salt lost each day is the same.
- D. water is not lost from the kidneys on hot days.



36. A student stands 2 m away from a plane mirror.



What will be the distance from the student to the virtual image?

- A. 2 m
- B. 4 m
- C. 6 m
- D. 8 m

37. Which substance will be a liquid at room temperature (20°C)?

substance	melting point/ $^{\circ}\text{C}$	boiling point/ $^{\circ}\text{C}$
A.	-101	-38
B.	34	357
C.	0	100
D.	114	183



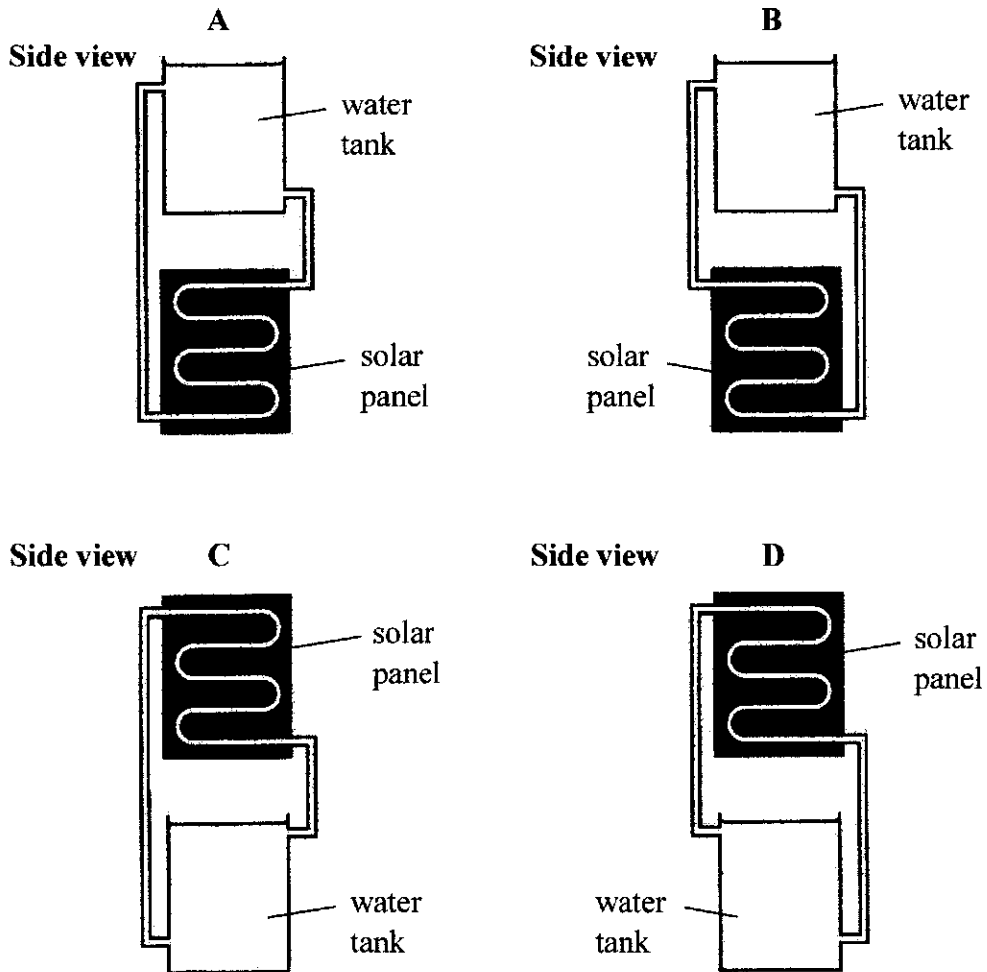
38. An athlete runs a 400 m race which results in oxygen debt.

What happens to the athlete towards the end of the race?

- A. breathing rate slows
- B. carbon dioxide levels in blood decreases
- C. oxygen demand exceeds oxygen supply
- D. cells respire aerobically

39. A solar panel is used to heat water. The hot water is then stored in a water tank and is returned to the solar panel for heating when the water cools. There is no pump to move the hot water to the water tank and the cooler water back to the panel.

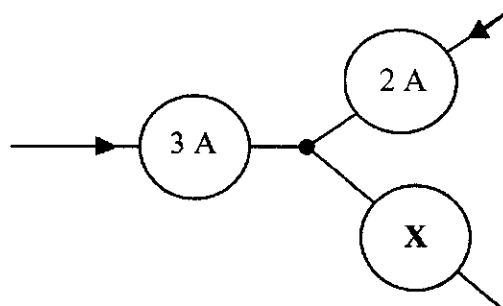
Which arrangement enables the hot water to move freely to the water tank and the cooler water to return to the solar panel?



40. Which element can usually be found in nature in a free (uncombined) state?

- A. aluminum
- B. barium
- C. calcium
- D. gold

41. The diagram shows the junction of three wires.

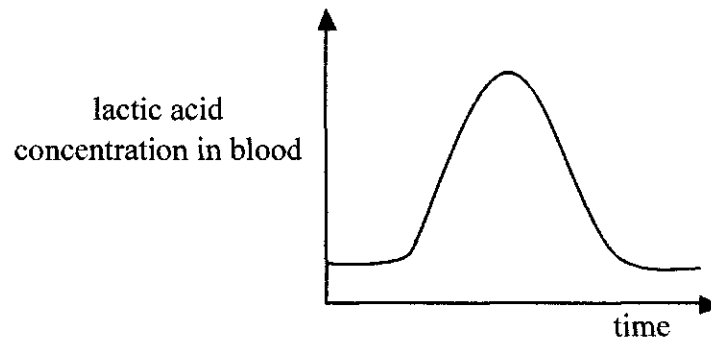


What is the amount of current and its directions as it flows through X?

- A. 1 A towards the junction.
 - B. 1 A away from the junction.
 - C. 5 A towards the junction.
 - D. 5 A away from the junction.
42. At which rate does a lamp rated 60 W, 120 V transfer electrical energy?
- A. 0.20 J/s
 - B. 60.0 J/s
 - C. 180.0 J/s
 - D. 7 200.0 J/s
43. Which substance would cause universal indicator to turn purple?
- A. sodium hydroxide
 - B. orange juice
 - C. milk
 - D. hydrochloric acid



44. The graph shows the changes in lactic acid concentration in the blood as a result of vigorous exercise.



Which statement correctly describes the metabolic process that causes the increase in lactic acid?

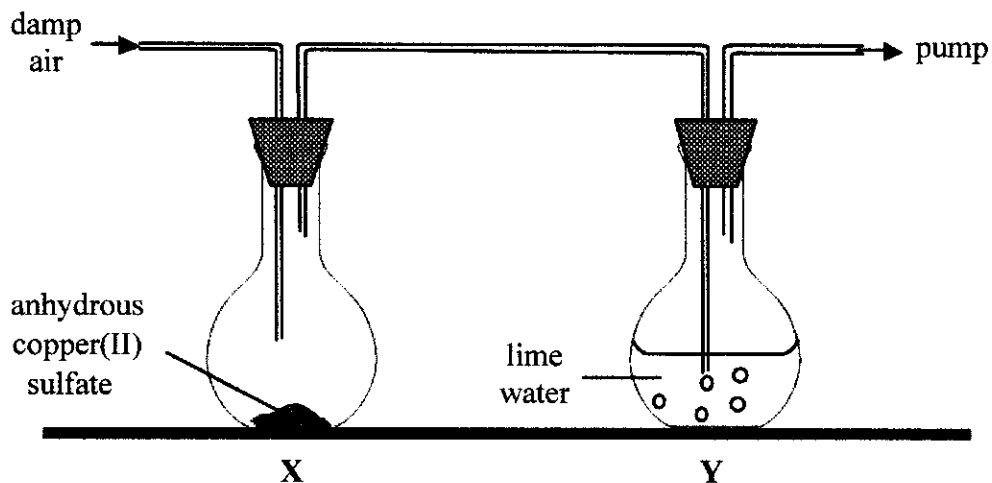
- A. aerobic respiration results in the complete breakdown of glucose in the skeletal muscles
 - B. aerobic respiration results in the incomplete breakdown of glucose in the smooth muscles
 - C. anaerobic respiration results in the incomplete breakdown of glucose in the skeletal muscles
 - D. anaerobic respiration results in the complete breakdown of glucose in the smooth muscles
45. A Royal Bahamas Defence Force marine sees the flare from a distress rocket in the sky and 5 s 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. 1 825 m
- C. 335 m
- D. 1 650 m



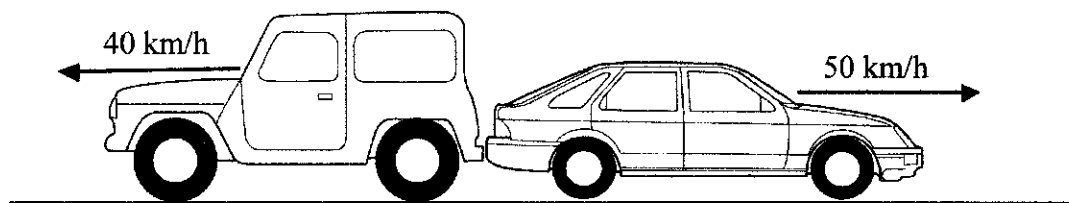
46. This apparatus is used to detect the presence of water and carbon dioxide in air.



Which row show the results if water and carbon dioxide are present?

results		
	X	Y
A.	blue	clear
B.	blue	milky
C.	white	clear
D.	white	milky

47. Two cars start from the same point, at 5 a.m., travelling in opposite directions at 40 and 50 km/h respectively.



At what time will they be 450 km apart?

- A. 9 a.m.
- B. 9 p.m.
- C. 10 a.m.
- D. 10 p.m.



48. The table shows the volume of two breaths of air. One breath was measured when the person was at rest and the other was measured after running a race.

	volume of air breathed in with one breath/cm³
at rest	450
after running	1 000

What would be the volume of carbon dioxide in the breath of air taken after running?

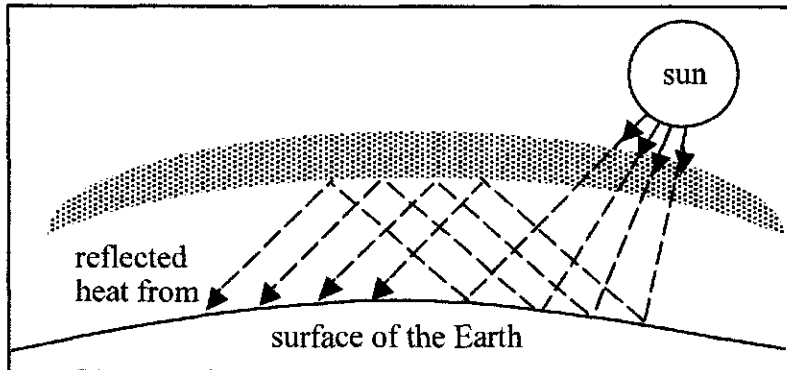
- A. 0.03 cm³
 - B. 0.3 cm³
 - C. 3.0 cm³
 - D. 30.0 cm³
49. A man uses a camera to take a photograph of himself. His eyes respond instantly to the flash.

Which part of the following describes how his eyes change?

	iris	pupil
A.	decreases in size	decreases in size
B.	decreases in size	increases in size
C.	increases in size	decreases in size
D.	increases in size	increases in size



50. This is a simplified diagram illustrating the greenhouse effect.



Which gas in the atmosphere is mainly responsible for reflecting heat?

- A. carbon dioxide
- B. nitrogen
- C. oxygen
- D. ozone



BLANK PAGE



School Number	Candidate Number
Surname and Initials	

COMBINED SCIENCE

PAPER 2 3102/2

Tuesday **29 MAY 2018** 1:30 P.M.–3:00 P.M.

No additional materials required.

<p>MINISTRY OF EDUCATION NATIONAL EXAMINATIONS</p>
--

BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION

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 on this question booklet.

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

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.

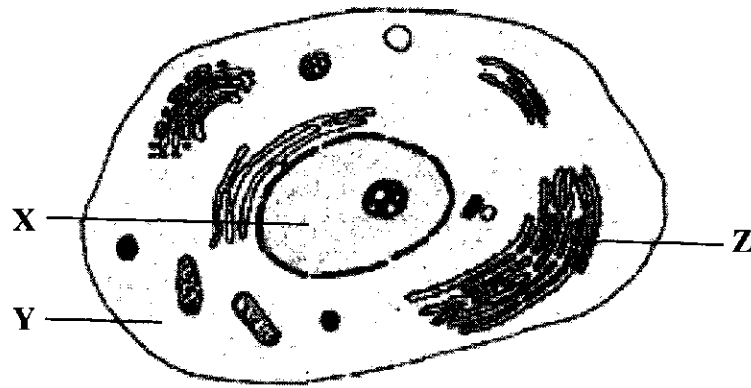
A copy of the Periodic Table is printed on page 2.

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 16 printed pages.

1. The diagram represents a cell.



(a) Name the kind of cell shown.

_____ [1]

(b) Give **TWO** reasons for your answer based on the diagram.

1. _____

2. _____ [2]

(c) (i) Name the parts labelled X, Y and Z.

X _____

Y _____

Z _____ [3]

(ii) Describe **TWO** features of the part Y.

_____ [2]

(iii) Name the structure that allows substances to enter or leave the cell.

_____ [1]

(d) Name the part of the cell where genetic materials are found.

_____ [1]



TOTAL MARKS [10]

2. This question is about the process of osmosis

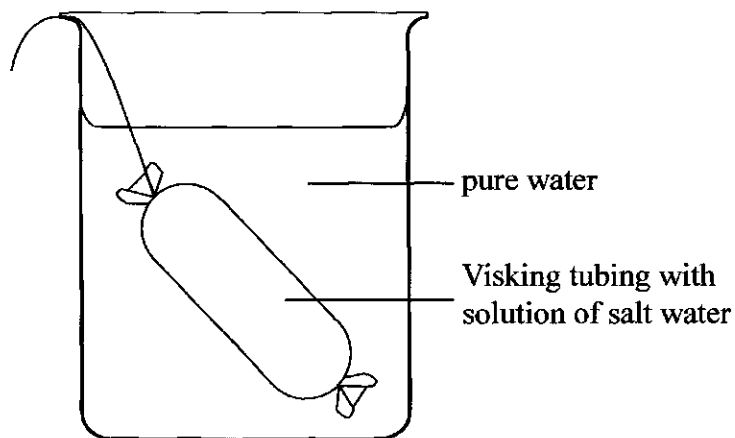
- (a) A semi-permeable membrane is necessary for the process of osmosis.

State another condition that is needed for osmosis.

_____ [1]

- (b) The diagram shows a solution of sodium chloride and water in a Visking tubing.

The Visking tubing is secured at both ends and then placed in a beaker filled with pure water.



- (i) Give the chemical name for the **solute** of the solution in Visking tubing.

_____ [1]

- (ii) Name the liquid that is more concentrated.

Give a reason for your answer.

Liquid _____

Reason _____ [2]

- (iii) Draw an arrow on the diagram to show the direction of the movement of the molecules between the solution in the Visking tubing and the water in the beaker.

Give a reason for your answer.

Reason _____ [2]



- (c) A student uses two different concentrations of sugar solutions to investigate osmosis in two slices of potato, X and Y.

One solution has four times the mass of solute than the other and both slices of potato have an initial mass of 1.35 g.

- (i) Potato slice X has a final mass of 1.50 g.

Calculate the percentage change in the mass of potato slice X.

[2]

- (ii) Potato slice Y decreases in mass.

Explain a possible reason for the decrease in the mass of potato slice Y.

[2]

TOTAL MARKS [10]



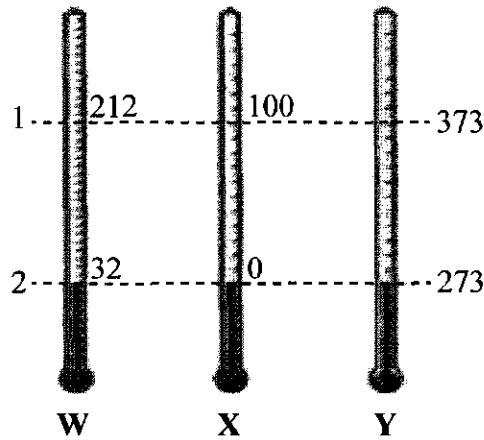
3. This question is about the difference between heat and temperature.

(a) Define the term **temperature** in terms of the kinetic theory.

[2]

(b) The diagram shows three thermometers labelled W, X and Y. Each has a different temperature scale.

The dotted lines, 1 and 2, show the thermometer readings at the same fixed points.



(i) Complete the table to show the boiling point and melting point of pure water.

thermometer	boiling point	freezing point
W		
Y		

[1]

[1]

(ii) Name the scale used for thermometer Y.

[1]

(iii) Name **TWO** liquids that are used in thermometers.

1. _____

2. _____

[2]



- (c) There are **THREE** main **methods** of **heat transfer**.

Identify the **method** of **heat transfer** described in each situation.

The transfer of heat:

- (i) between two objects in contact

- (ii) by electromagnetic waves

- (iii) by changes in the density in a liquid.

[3]

TOTAL MARKS [10]



4. This question is about germination.

(a) (i) Define the term **germination**.

[1]

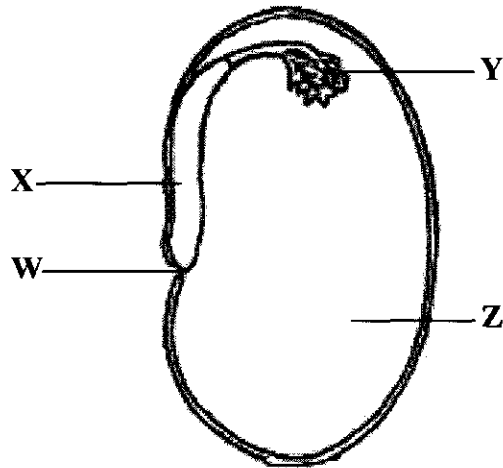
(ii) Explain the role of **water** and **enzymes** in the germination process.

water _____

enzymes _____

[2]

The diagram shows a broad bean seed cut in half.



(b) State the functions of parts labelled W, X and Y.

W _____

X _____

Y _____

[3]



- (c) (i) Identify the structure labelled **Z** and describe its function.

Z _____ [1]

Function _____ [1]

- (ii) Name a **nutrient** found in beans and name a **reagent** that is used to test for the presence of this nutrient.

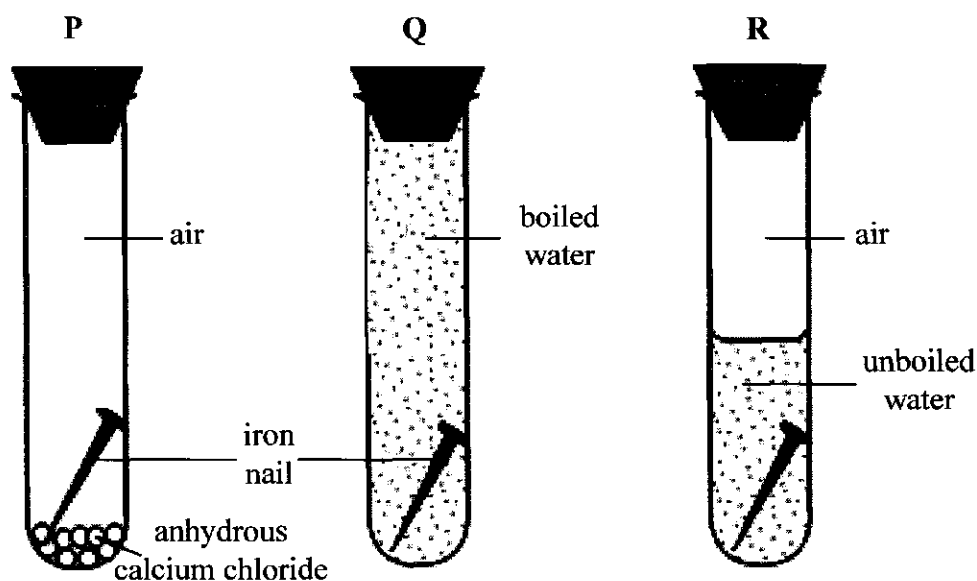
nutrient _____

reagent _____ [2]

TOTAL MARKS [10]



5. A student carried out an experiment to investigate factors responsible for the corrosion of iron nails.



A student wrote the following observation. After 7 days one of the nails had increased in mass and was covered in a reddish-brown precipitate.

- (a) (i) State the name given to this type of corrosion of the iron nails.
_____ [1]
- (ii) Give the **chemical** name of the red-brown solid (precipitate) observed.
_____ [1]
- (iii) At the start of the experiment identify the test-tube(s) which most likely gave the observations recorded.
_____ [1]
- (iv) Explain why these observations were made for the test tube(s) identified in (a) (iii).

_____ [2]
- (v) Suggest what can be done to the iron nail to prevent the changes observed.
_____ [1]



(b) The stopper from test tube Q is removed and after a further 7 days the nail is observed.

(i) Suggest what is observed in the iron nail in test tube Q on day 14.

_____ [1]

(ii) Give a reason for your answer to (b) (i).

_____ [1]

(c) The experiment is repeated by another student using seawater instead of boiled water.

State whether the use of seawater would result in a change to the original observations by the student. Explain your answer.

explanation _____

_____ [1]

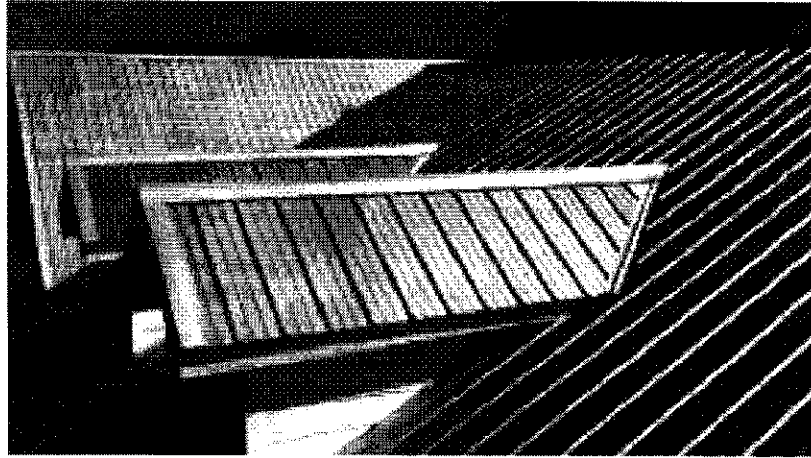
(d) Briefly explain why copper nails and screws are used on boats exposed to air and seawater.

_____ [1]

TOTAL MARKS [10]



6. Many homeowners in The Bahamas are constructing homes using metal roofs.



Roofing materials expand with an increase in temperature. This is known as the expansion factor.

The table shows the expansion factor and the cost of common roofing materials.

roofing material	expansion factor	cost of roofing per m ²
aluminum	22.6	\$375.00
iron	12.0	\$265.00
copper	16.6	\$1 250.00
zinc	29.7	\$900.00
shingles (asphalt)	0.0	\$90.00

(a) A homeowner is trying to decide on which material to use to construct his roof.

(i) State which metal is the least likely to expand with an increase in temperature and give a reason for your choice of metal.

reason.

_____ [2]

(ii) Suggest a possible reason why the homeowner is less likely to choose the metal named in (b) (i) for his roof.

likely to choose asphalt shingles over copper metal for his roof.

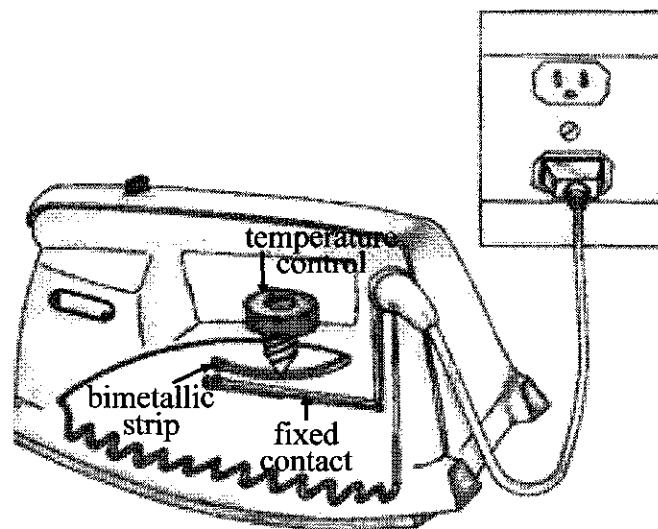
_____ [2]



- (b) Draw a labelled diagram to show what you would expect to see when a bimetallic strip made of copper and iron is heated to a high temperature.

[2]

- (c) Almost every household in The Bahamas has an electric iron. An electric iron contains a bimetallic strip.



- (i) Explain how a bimetallic strip is used in an electric iron to prevent the iron from overheating.

[2]

- (ii) Use the kinetic theory to explain what happens to metals when they are heated.

[2]



TOTAL MARKS [10]

7. The table shows a list of various substances and their densities.

substance	density/gcm⁻³
helium	0.00018
dry air	0.00128
kerosene	0.82
carbon dioxide	0.00196
aluminum	2.70
water	1.000
iron	7.87
silver	10.5
lead	11.34
gold	19.32

(a) Use the information in the table to explain why:

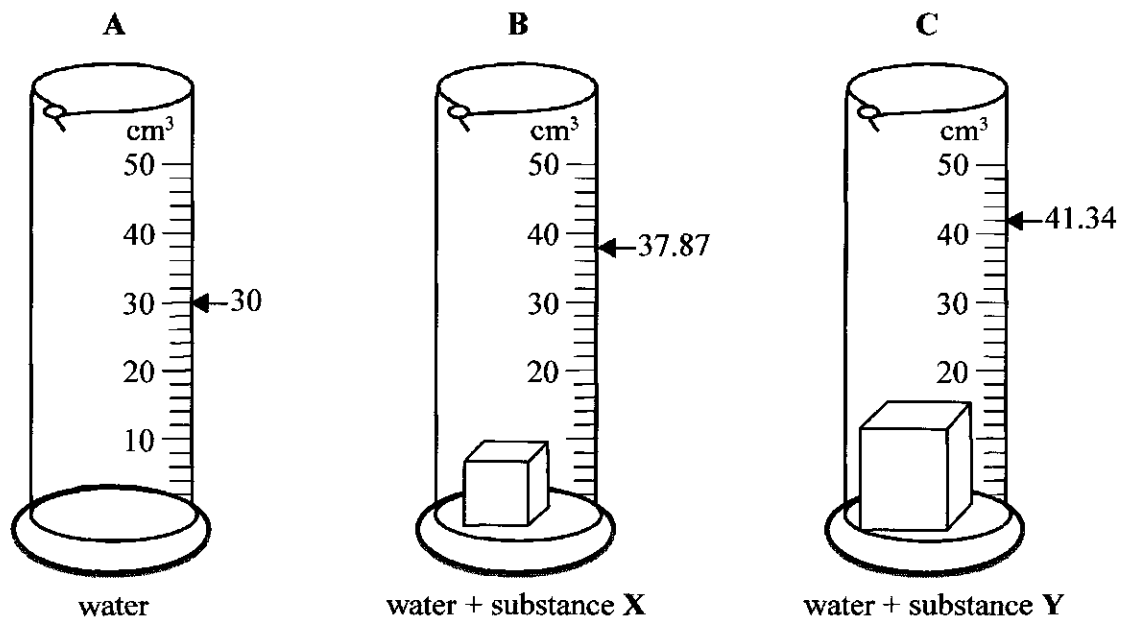
a balloon filled with helium gas will rise in dry air

carbon dioxide gas is used to put out fires.

[2]



(b) The measuring cylinders show three different volume readings.



Cylinder **B** and cylinder **C** have objects of different volumes lowered into them.

Assuming the displaced volume of the substance in the measuring cylinders is equal to its density.

(i) Use the information in the table and the readings on cylinders **A**, **B** and **C** to identify substances **X** and **Y**.

X _____

Y _____

[2]

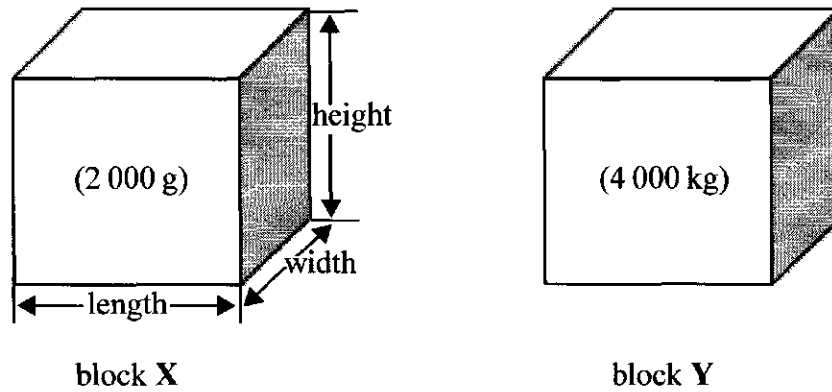
(ii) Kerosene and water are both liquids that do not mix.

Explain how these two liquids can be separated.

[2]



- (c) The diagram shows two blocks labelled X and Y. Both blocks have the same dimensions: height = 5 cm, length = 10 cm, width = 2 cm.



- (i) Give the difference in mass between block X and block Y.

_____ [1]

- (ii) Calculate the density for block X. Show formula and working.

Give the answer units in kg/cm^3

[3]

TOTAL MARKS [10]



8. Atoms can combine to form **molecules**. Atoms lose or gain electrons to form **ions**.

(a) Use this information to describe the following substances;

(i) carbon dioxide _____ [1]

(ii) Na^+ _____ [1]

(iii) State the number of protons and electrons in a sodium ion.

number of protons _____ [1]

number of electrons _____ [1]

(b) (i) Name the type of bonding found in a molecule of oxygen.

_____ [1]

(ii) Draw a dot and cross diagram to show the bonding in an oxygen molecule. (Use outer shell electrons only).

[2]

(iii) Describe **ONE** way the structure of H_2O is similar to NaCl .

_____ [1]

(c) A magnesium atom has an electron configuration of 2, 8, 2.

(i) Write the electron configuration of a magnesium ion;

_____ [1]

(ii) Use the Periodic Table to look up Neon.

Explain how a sodium ion is similar to a neon atom

_____ [1]



TOTAL MARKS [10]

School Number	Candidate Number
Surname and Initials	

COMBINED SCIENCE

PAPER 3 3102/3

Wednesday **6 JUNE 2018** 9:00 A.M.–10:30 A.M.

Additional materials:
Graph paper

<h2>MINISTRY OF EDUCATION</h2> <h2>NATIONAL EXAMINATIONS</h2>

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 on this question booklet.

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

Answer **ANY TWO** (2) out of the **THREE** (3) questions from **Section B** on the lined pages provided in this 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 17 printed pages, 4 lined pages and 3 blank pages.

The Periodic Table of the Elements

Group																											
I	II	III	IV	V	VI	VII												0									
7 Li Lithium 3	9 Be Beryllium 4																	4 He Helium 2									
23 Na Sodium 11	24 Mg Magnesium 12	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	39 K Potassium 19	40 Ca Calcium 20	84 Kr Krypton 36										
85 Rb Rubidium 37	88 Sr Strontium 38	51 V Vanadium 23	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	133 Cs Caesium 55	137 Ba Barium 56	131 Xe Xenon 54										
133 Cs Caesium 55	137 Ba Barium 56	51 V Vanadium 23	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	133 Cs Caesium 55	137 Ba Barium 56	131 Xe Xenon 54										
87 Fr Francium 87	226 Ra Radium 88	89 Y Yttrium 39	89 Zr Zirconium 40	91 Nb Niobium 41	91 Ti Titanium 22	91 Zr Zirconium 40	91 Nb Niobium 41	91 Zr Zirconium 40	91 Nb Niobium 41	91 Zr Zirconium 40	91 Nb Niobium 41	91 Zr Zirconium 40	91 Nb Niobium 41	91 Zr Zirconium 40	227 Ac Actinium 89	227 Ac Actinium 89	227 Ac Actinium 89										
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	144 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	152 Gd Gadolinium 64	157 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	144 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	152 Gd Gadolinium 64	157 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
90 Th Thorium 90	91 Pa Protactinium 91	238 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	90 Th Thorium 90	91 Pa Protactinium 91	238 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

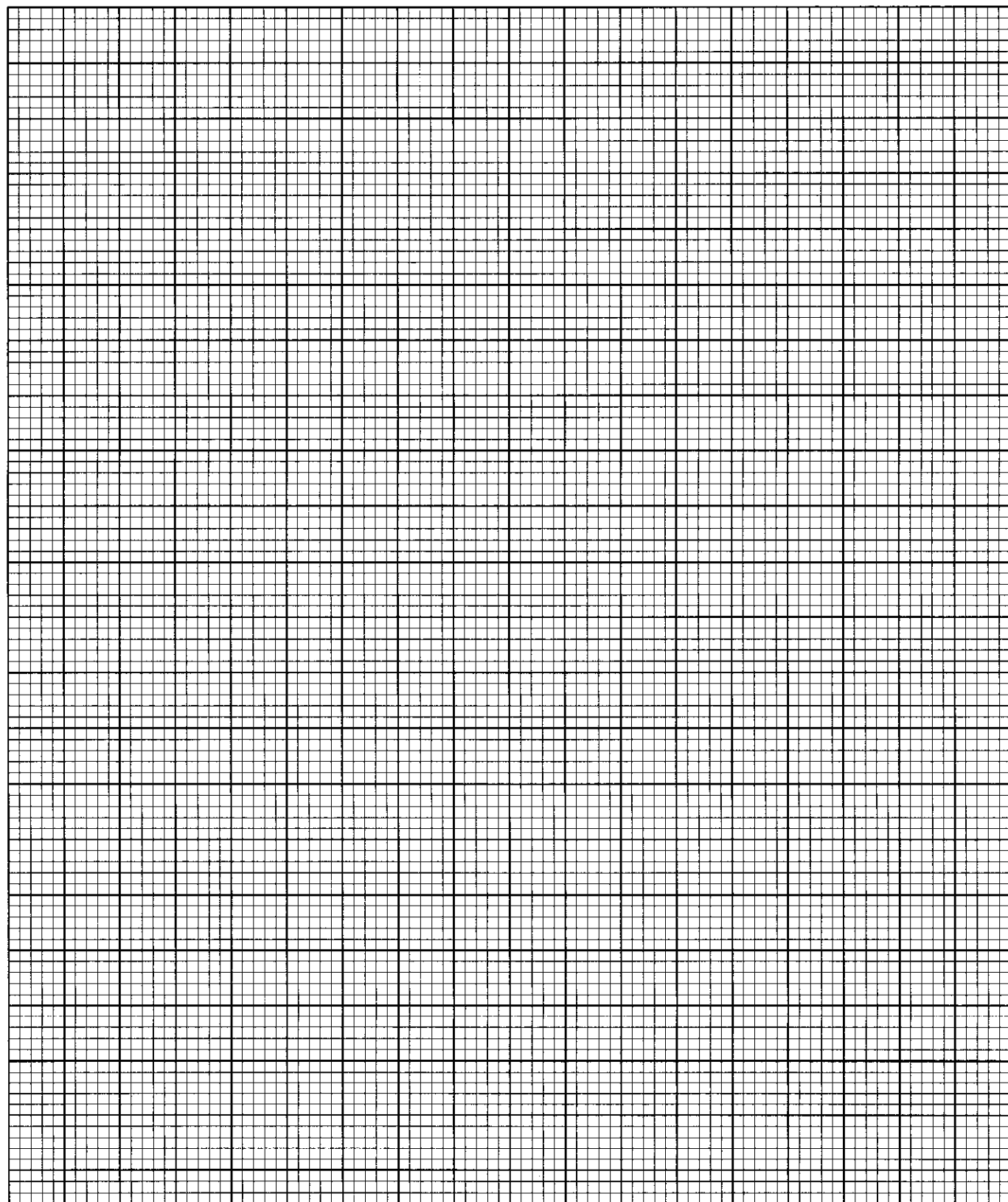
Key
 $\begin{matrix} a \\ X \\ b \end{matrix}$ a = relative atomic mass
 $\begin{matrix} X \\ \end{matrix}$ X = atomic symbol
 $\begin{matrix} b \\ \end{matrix}$ b = proton (atomic) number

SCIENCE GRAPH PAPER

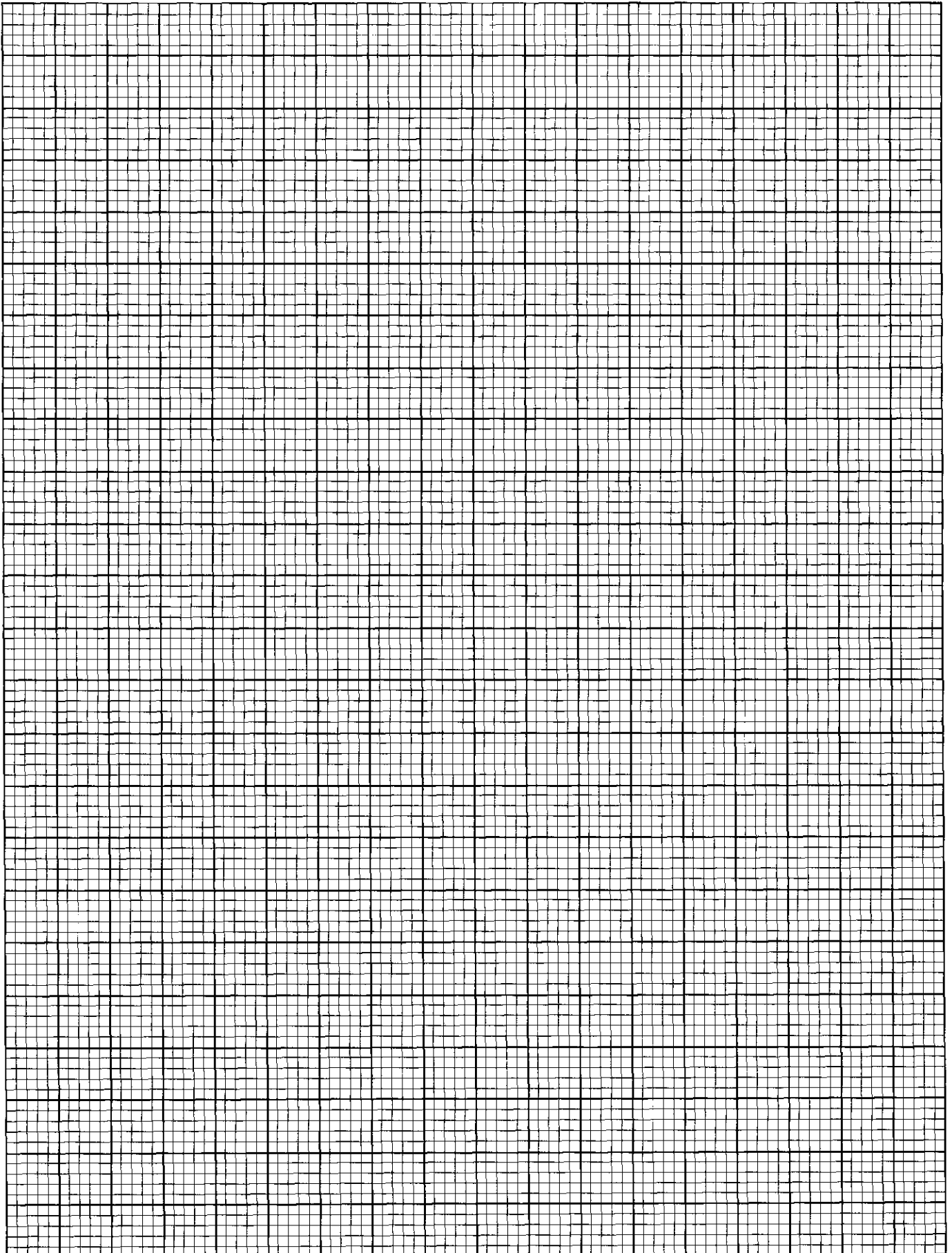
**MINISTRY OF EDUCATION
BAHAMAS GENERAL CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION**

AB7

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



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



SECTION A

Answer ALL questions in this Section.

1. The mangrove swamp is an important coastal ecosystem found in The Bahamas.

(a) Define the term **ecosystem**.

[1]

(b) The diagram represents two types of mangroves labelled X and Y.



(i) On which side of a coastal island are mangroves most prevalent.

[1]

(ii) Identify the types of mangroves shown in the diagram above and give **one** reason for your answer.

Type	Reason
X _____	_____
Y _____	_____

[4]

- (c) Explain why there is sometimes an unpleasant smell coming from mangrove swamps.

[2]

- (d) Mangrove trees face many challenges living in their environment.

Explain how **both** trees **X** and **Y** are adapted to survive in their environment.

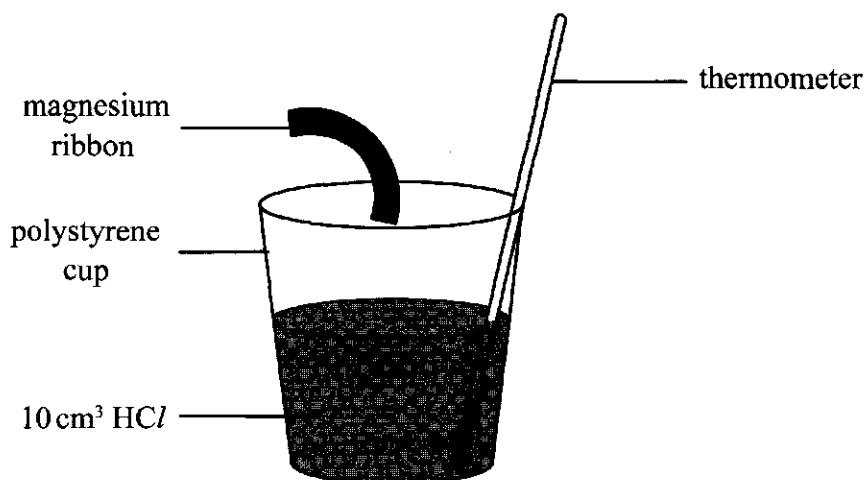
[2]

TOTAL MARKS [10]

2. A student carries out an experiment in which different lengths of magnesium ribbon are added to 10 cm^3 of dilute hydrochloric acid.

Magnesium ribbons are measured in increments of 5 cm. The temperature is recorded when each length of ribbon is added to the acid.

The apparatus is set up as shown.



- (a) The table shows the data collected

length of magnesium ribbon/cm	temperature/°C
0	27
5	30
10	33
15	36
20	35
25	34
30	33
35	32

- (i) Suggest why the temperature increases at the beginning of the reaction.

_____ [1]

- (ii) State the total length of magnesium ribbon which completely reacts with the 10 cm^3 of hydrochloric acid.

_____ [1]

(iii) Briefly state why the temperature starts to decrease.

_____ [1]

(iv) Calculate the temperature change in the reaction.

_____ [1]

(v) The temperature recorded was lower than expected.

Suggest **TWO** ways in which the student could improve the experiment.

1. _____

2. _____ [2]

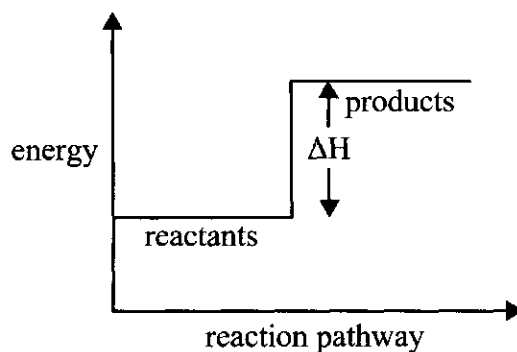
(vi) Write a balanced chemical equation for the reaction between magnesium and hydrochloric acid.

_____ [1]

(vii) Use the information in the table to (a) (vi) to determine which process, bond breaking or bond making required more energy.

_____ [1]

(b) The diagram shows the energy level of a reaction.



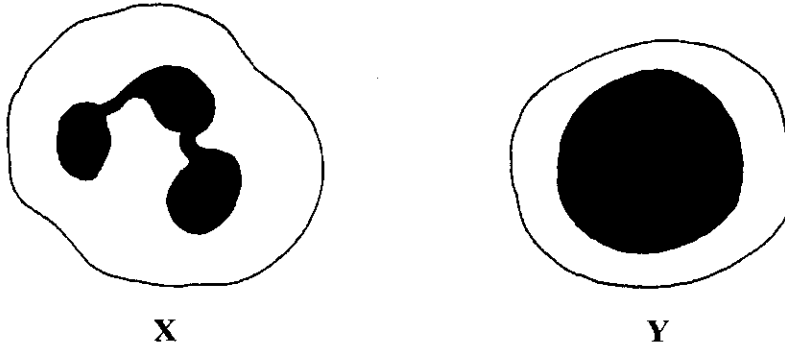
State what type of reaction is shown by the energy level diagram and give a reason for your answer.

type of reaction _____ [1]

reason _____ [1]

TOTAL MARKS [10]

3. The diagram shows **TWO** types of white blood cells **X** and **Y**.



(a) (i) State where in the body these cells **X** and **Y** are made.

X _____

Y _____ [2]

(ii) Describe the function of cell **X**.

_____ [1]

(iii) Describe how the structure of cell **X** is adapted so it can carry out its function.

_____ [1]

(b) Cell Y produces proteins that help the body to protect itself against diseases.

(i) Name these proteins and explain how they work to protect the body.

[2]

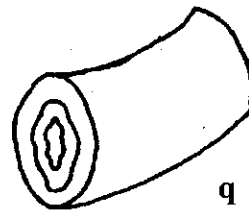
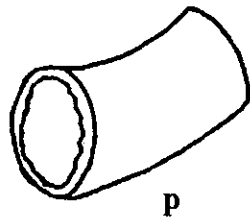
(ii) The proteins made by cell Y also boosts the body's immunity to a particular disease.

Explain how the body develops an immunity to a disease.

[2]

(c) The diagrams represent **TWO** types of blood vessels found in the human body.

NOT DRAWN TO SCALE



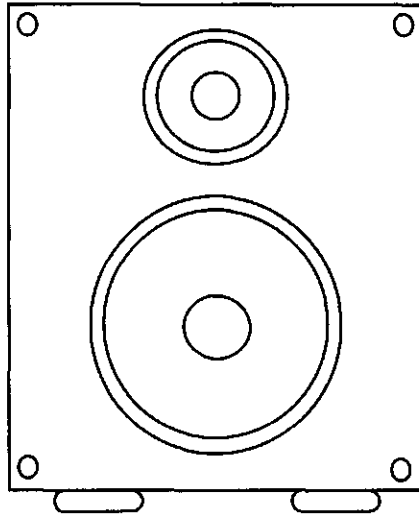
Give **TWO** structural differences between blood vessel **p** and blood vessel **q**.

[2]

TOTAL MARKS [10]

4. This question is about sound.

- (a) A loudspeaker system used in a hi-fi set consists of two loudspeakers; one has a diameter of 6 cm and the other a diameter of 30 cm.



The loudspeaker reproduces sounds that range in frequency between 20 Hz and 15 000 Hz.

The speed of sound in air is 330 m/s.

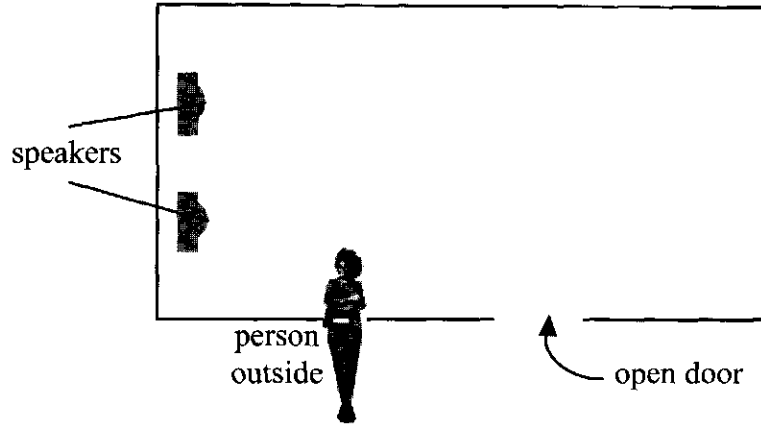
- (i) Calculate the wavelength in air of a sound that has a frequency of 15 000 Hz. (Write the equation and show all working).

[3]

- (ii) Explain why a sound of this wavelength should be reproduced using the smaller loudspeaker.

[2]

- (b) The diagram shows the plan view of a room with the position of a person standing outside as shown.

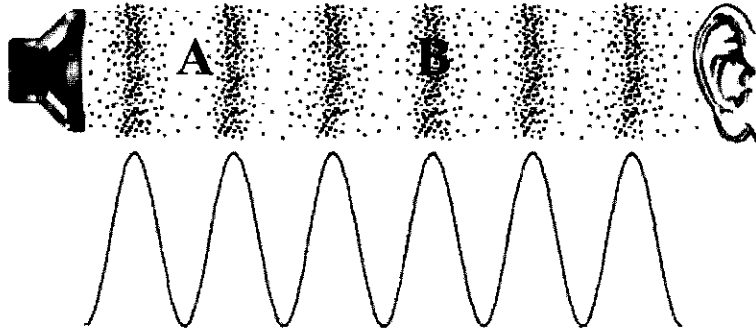


The sounds from the loudspeaker reach the person through the open doorway.

With the aid of a diagram, explain how the sound reaches the person outside the room.

[3]

(c) The diagram shows how sound waves are transmitted in air.



Briefly explain how the parts A and B on the diagram help to explain the transmission of sound waves.

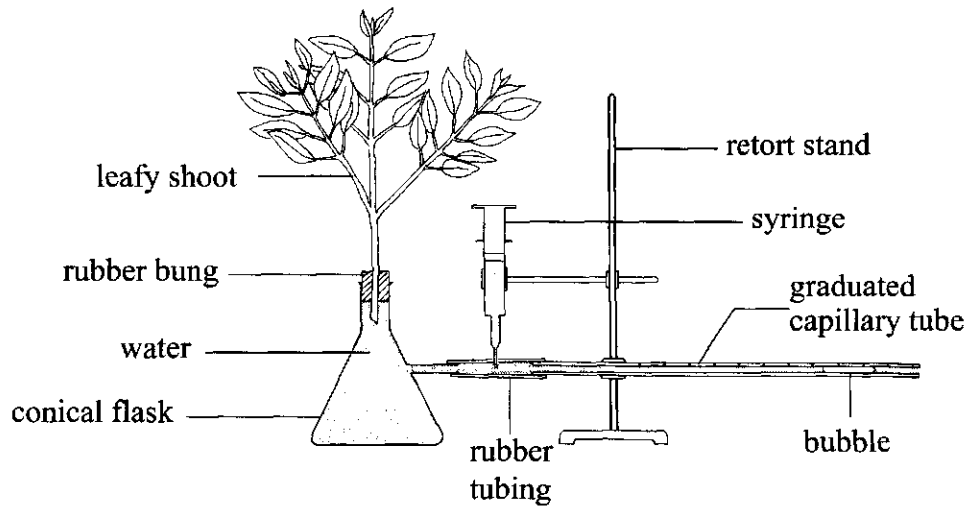
A _____

B _____
_____ [2]

TOTAL MARKS [10]

SECTION B

5. (a) (i) Give a brief outline of how water travels upwards from the roots, through the stem, to the leaves and into the air. [3]
- (ii) Name the process described in (a) (i). [1]
- (b) The diagram shows an apparatus which measures the rate of this process in a green leafy shoot.



The leafy shoot's uptake and loss of water is measured and recorded at four-hour time intervals over a 24 hour period.

The data shows the water uptake and water loss in a leafy shoot over a 24 hour period.

rate of water movement							
time	6am	10 am	2 pm	6 pm	10 pm	2 am	6 am
uptake/mL	100	150	300	300	200	200	100
loss/g	50	100	500	300	50	50	50

- (i) Plot a graph of both sets of results. [4]
- (ii) On the graph, draw an X to show where the water uptake and water loss is equal. [1]
- (iii) Suggest why you should consider leaf surface area in tabulating your results. [2]
- (iv) State how the results in this experiment would be different if the lower surface of each leaf is coated with Vaseline. [1]

- (c) Three plants were each placed in three different rooms with environmental conditions as follows:

Plant 1 is placed in a room with high humidity and all windows and door closed.

Plant 2 is placed in front of a powerful fan in a room with no windows or doors.

Plant 3 is placed in a room with an air conditioning unit at a temperature of 16°C.

Describe the effects of these environmental conditions on the transpiration rate of each plant. [6]

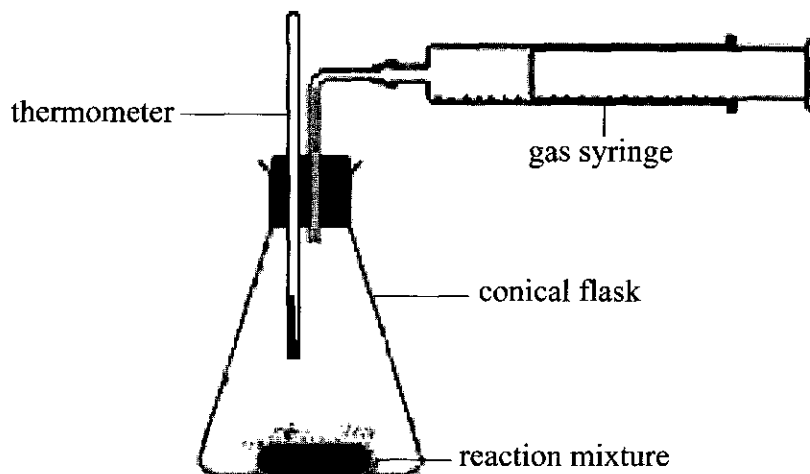
- (d) Explain **one** way how leaves are structural adapted to control the water content of a green plant.

(i) in a dry environment

(ii) in a watery environment. [2]

TOTAL MARKS [20]

6. In an experiment, a student mixes 30 cm^3 of 1 M hydrochloric acid with a 3.0 g lump of calcium carbonate at 25°C .



The volume of the gas given off in the reaction is measured at regular intervals and recorded.

time/minutes	1	2	3	4	5	6	7	8
volume of gas/ cm^3	26	40	47	51	53	54	54	54

- (a) (i) Plot a suitable graph to show the results obtained by the student. [4]
- (ii) Use your graph to find the amount of gas produced after 130 seconds. [1]
- (iii) Briefly explain **how** and **why** the rate of the reaction changes as the reaction proceeds. [2]
- (b) Use the kinetic theory to explain how the initial rate of the reaction would be affected by the use of
- (i) hydrochloric acid with a concentration of 2 M ; [2]
- (ii) calcium carbonate in the form of powder. [2]
- (c) On the graph in (a) (i), draw a line to show how the rate of reaction would change if 3.0 g powdered calcium carbonate was used instead of 3.0 g lump. [1]
- Label this line with the letter **B**.

- (d) The student used the same apparatus to investigate the reaction between manganese (IV) oxide and hydrogen peroxide.

They vary the amount of manganese (IV) oxide they added to the hydrogen peroxide.

In the **first** experiment they added 2.0 g of manganese (IV) oxide to 40 cm³ samples of hydrogen peroxide.

In the **second** experiment they added 4.0 g of manganese (IV) oxide to 40 cm³ samples of hydrogen peroxide.

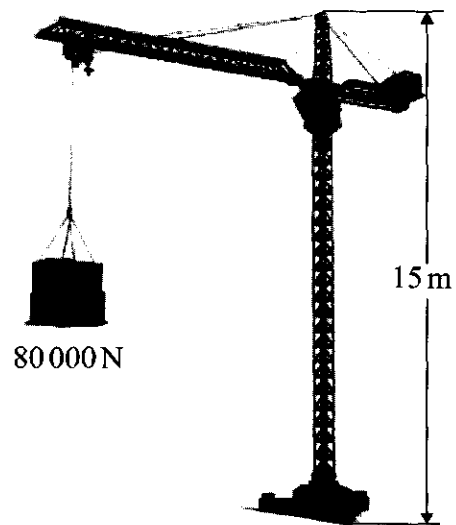
The oxygen gas released in each investigation is collected in the gas syringe.

- (i) State the purpose of the manganese (IV) oxide. [1]
- (ii) State which of the experiments will produce more oxygen in less time. [1]
- (iii) State how much of the manganese (IV) oxide would remain after experiment **B** is completed. Give a reason for your answer. [2]
- (iv) State how you would test the gas to show that it was oxygen. [2]
- (e) Write a balanced chemical equation for the production of oxygen gas using hydrogen peroxide. [2]

TOTAL MARKS [20]

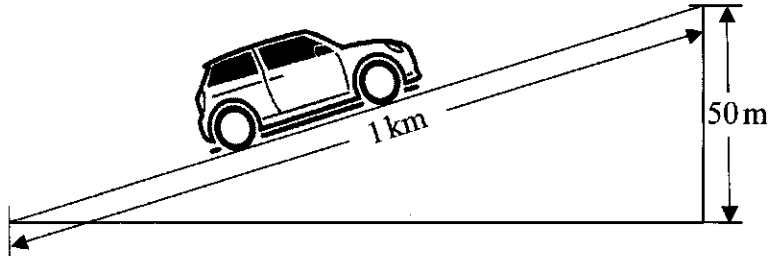
7. This question is about power, work and energy.

The diagram shows a crane used to build large facilities like the National Stadium.



- (a) The crane lifts a load of 80 000 N through a vertical distance of 15.0 m.
- (i) Calculate the potential energy gained by the load. [3]
- (ii) How much work is done by the crane? [3]
- (b) The load is lifted at a speed of 0.3 m/s.
- (i) Calculate the time it takes the crane to lift the load 15.0 m. [3]
- (ii) Find the power output of the crane in lifting the load. [2]

- (c) A vehicle of weight 5000 N climbs a slope 1 km long which raises the vehicle a vertical distance of 50 m. The driver maintains a constant speed of 25 m/s while he travels to the top of the hill.



- (i) Find how long it took the vehicle to reach the top of the hill. [3]
- (ii) Ignoring frictional forces, calculate the power developed by the vehicle, as it climbs the hill. [3]
- (iii) Outline the main useful energy transfers which takes place as the vehicle climbs the hill. [3]

TOTAL MARKS [20]

BLANK PAGE

BLANK PAGE

BLANK PAGE