School Number

Candidate Number

Surname and Initials

COMBINED SCIENCE

PAPER 2   3102/2

Tuesday   **29 MAY 2012**   1.30 – 3.00 P.M.

No additional materials required.

MINISTRY OF EDUCATION
NATIONAL EXAMINATIONS

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 space provided on this page.

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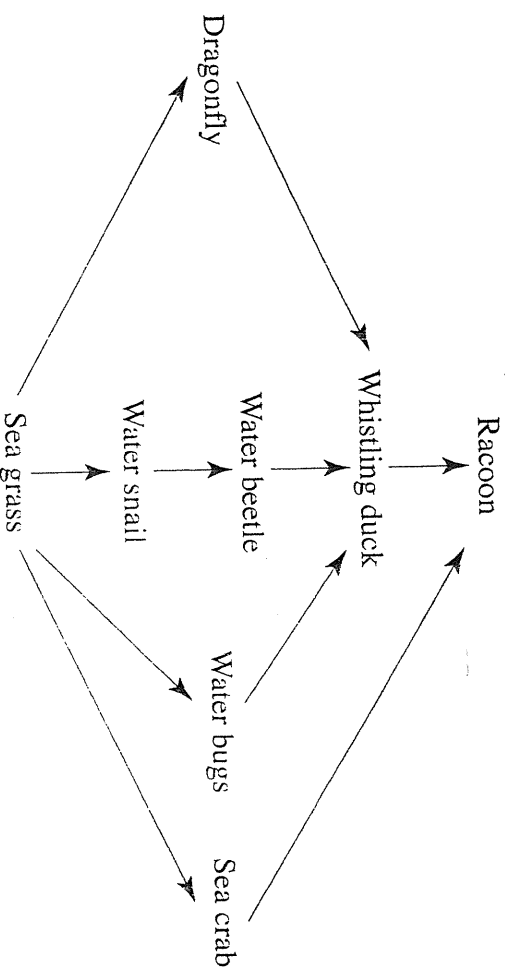
A copy of the Periodic Table is printed on page 2.

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

For Examiner's Use	
1	
2	
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8	
TOTAL	

This question paper consists of __17__ printed pages and __3__ blank pages.

[Turn over

1. The diagram represents a food web found in a mangrove swamp.

Dragonfly

Whistling duck

Racoon

Sea grass → Water snail → Water beetle → Whistling duck

Water bugs

Sea crab

(a) (i) State the main source of energy in this food web.

_____ [1]

(ii) Identify the feeding level of the water beetle in the food web.

_____ [1]

(iii) Name TWO organisms considered to be secondary consumers.

1 _____

2 _____ [1]

(iv) Explain what the arrows in a food web or food chain represent.

_____ [1]

(b)   (i)   Construct a food chain using **THREE** organisms from the food web.

[2]

       (ii)   Suppose all the sea crabs are killed by a disease.

              Suggest the effect this would have on the population of any **ONE**
              named organism in this food web.

              name _____

              effect _____

                                                                              [2]

(c)   (i)   Name another group of organisms, other than producers and
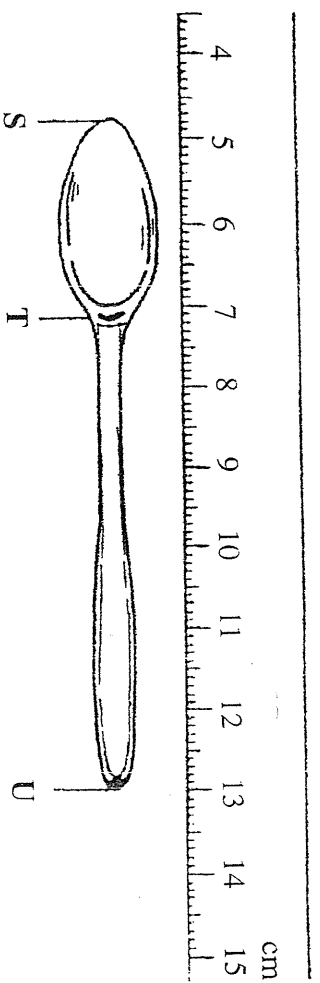   consumers, which must exist in an ecosystem.

              _____

                                                                              [2]

       (ii)   Give **ONE** reason why this group is essential in an ecosystem.

              _____

                                                                              [1]

                                                          Total marks [10]

2. The diagram shows the linear measurement of a teaspoon.

(a) (i) Find the length of the teaspoon.

_____ [1]

(ii) Determine the length of the teaspoon between **T** and **U**. (Show all working).

_____ [1]

(b) (i) Name the instrument which could determine the mass of the teaspoon.

_____ [1]

(ii) Calculate the weight of the teaspoon if its mass is 27 g.

_____ [1]

(c) (i) Calculate the density of the spoon if the volume is 15 cm³.

[2]

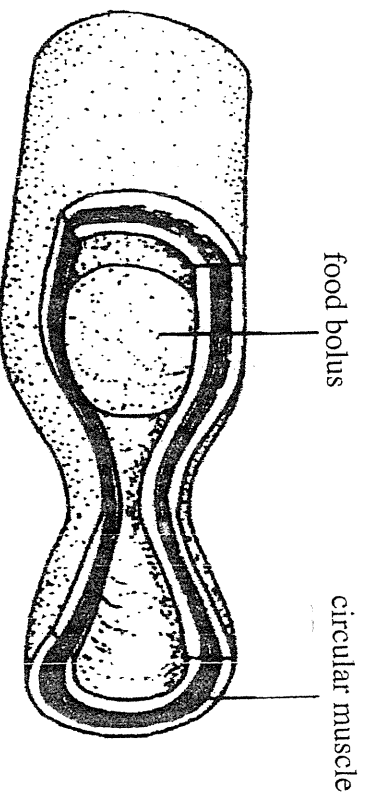(ii) Briefly describe, using diagrams, how you would measure the volume of the teaspoon.

_____

_____

_____

_____

_____

_____

_____

_____

[4]

Total marks [10]

3. The diagram show a bolus of food as it moves through the digestive tract.

food bolus

circular muscle

(a) (i) Name the process occurring in the diagram and state the structure in the digestive tract where it occurs.

process _____

structure _____ [2]

(b) On the diagram, draw in an arrow to show the direction of the bolus. [1]

(c) Describe the action of the circular muscle in the movement of the bolus in the digestive tract.

_____

_____ [2]

(d) (i) Name a substance secreted by the walls of the stomach and state its function in the digestion of milk in young babies.

name _____

function _____ [2]

(ii) Excess hydrochloric acid in the digestive system sometimes results in a burning pain.

Identify the kind of substance that would neutralise this acid and stop the pain.

_____ [1]

(e) The liver produces a substance which is added directly to the partly digested food in the small intestine.

Name the substance and describe its function in digestion.

substance _____

function _____

_____

_____

[2]

Total marks [10]

4. During an investigation about **physical and chemical changes**, experiments **W**, **X**, **Y** and **Z** were conducted and observations recorded in the table.

	experiment	observations
W	Heats iodine (black solid) and left to cool for 5 minutes	gives off purple vapour, changes to a black solid when cooled
X	Burns magnesium ribbon (dark grey solid) in air	white ashes produced, heat and a bright light are given off
Y	Dissolves table salt, a white crystalline solid, in water	colourless substance produced
Z	Heats sulphur and iron (yellow powder with black bits)	black solid is formed

(a) (i) Identify the **type of change** which occurs in experiments **X** and **Y**.

X _____

Y _____

[2]

(ii) State **TWO** ways that a **physical change** differs from a **chemical change**.

1 _____

_____ [1]

2 _____

_____ [1]

(b) In experiment X, magnesium burns in air to form a white solid.

(i) Write a word equation for this reaction.

_____ [2]

(ii) Write the chemical formulae of the **reactant(s)** and **product(s)** in experiment X.

reactant(s)

product(s)

[2]

(iii) The burning of magnesium ribbon produces heat and a bright, white light.

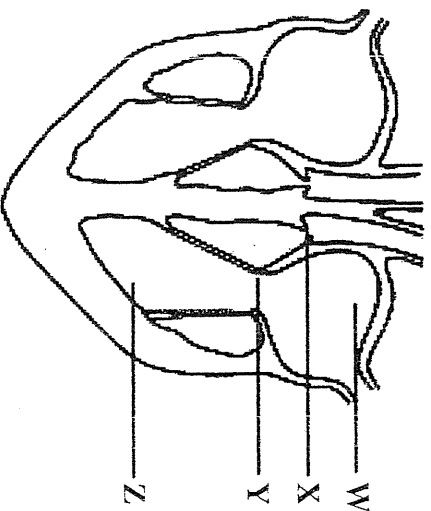Write the term to describe the heat and light that are given off.

_____ [1]

(c) During the heating of the solid iodine in experiment W, a purple gas is given off.

Write the name given to this change in state from a solid directly to a gas.

_____ [1]

Total marks [10]

5. The diagram shows a longitudinal section through the heart and its major blood vessels.

(a) (i) Name the structures labelled **X** and **Y**.

X _____

Y _____ [2]

(ii) State the function of **X** and **Y**.

_____

_____ [1]

(b) (i) Briefly describe the term **double circulation**.

_____

_____ [2]

(ii) On the diagram use arrows to show the flow of blood from the pulmonary vein through the heart and out through the aorta. [1]

(c) (i) At rest, the human heart pumps about 6 litres of blood per minute. calculate how many litres of blood are pumped in one day. (Show your working).

[2]

(ii) Name two factors that contribute to an increase in heart rate.
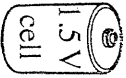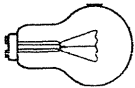
1 _____

2 _____

[2]

Total marks [10]

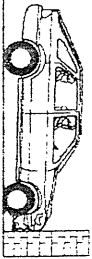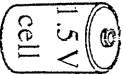6. (a) (i) Define the term **energy**.

_____

_____ [1]

(ii) State the **law of conservation of energy**.

_____
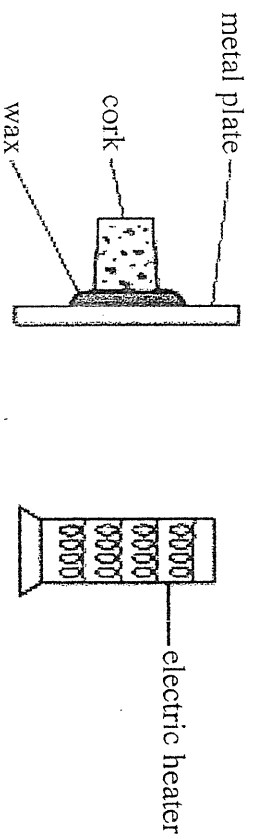
_____ [2]

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

_____ [1]

(c) Complete the table to show the main energy transfer by the devices. [4]

energy in	device	energy out
	1.5 V cell	
	lightbulb	
	iron	
	car	
	1.5 V cell	

(d) Heat is transferred from one substance to another as a result of a difference in temperature.

metal plate ———

cork ———

wax ———

———electric heater

State the method by which energy is transferred from the

(i)   electric heater to the metal plate; _____ [1]

(ii) metal plate to the wax. _____ [1]

Total marks [10]

7. Many substances can be classified as elements, compounds or mixtures.

(a) (i) Classify each substance as either an **element**, a **compound** or a **mixture**, each may be used **once**, **more than once** or **not at all**.

air _____

salt _____

concrete _____

water _____

[4]

Cement is made by heating limestone with alumina and is used as a binder in making concrete.

(ii) Describe **TWO** observations after a construction worker spills hydrochloric acid (muriatic acid) on a concrete floor.

1 _____

2 _____

[2]

(iii) Suggest the name of the substance in the concrete which causes this reaction.

_____

[1]

An alloy of copper is stronger than pure copper metal.

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

_____

[1]

Brass is manufactured by heating the metal copper with another metal, Q.
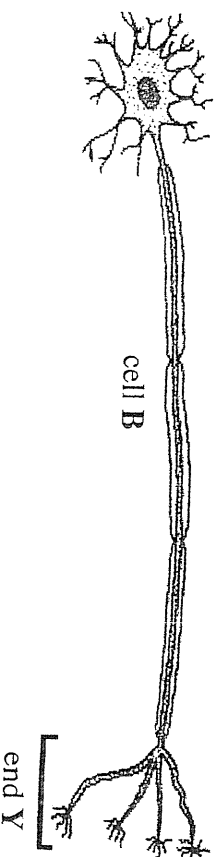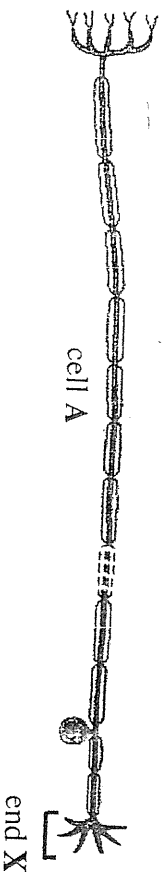
(ii) Name the metal Q.

_____

[1]

(iii) Give **ONE** property of brass.

_____

[1]

Total marks [10]

[Turn over

8. The diagram shows the structure of two different kinds of neurons in the nervous system.

cell A

end X

cell B

end Y

(a) (i) Identify the neurons labelled **A** and **B**.

A _____

B _____ [2]

(ii) State exactly where the end **X** of cell **A** is found.

_____ [1]

(b) (i) Draw an arrow alongside cell **B** to show the direction in which a nerve impulse would travel. [1]

(ii) State the name of the action produced at the end **Y** of cell **B**, when it receives nerve impulses.

_____ [1]

(iii) Describe how this action is beneficial to the organism.

_____ [1]

(c) A nerve impulse is transmitted from one neuron to another across an **empty space**.

Give the name of this space.

_____ [1]

(d) (i) What are **hormones**?

_____

_____ [1]

(ii) State **TWO** ways how hormonal responses are different from nervous responses (actions).

1 _____

_____

2 _____

_____ [2]

Total marks [10]

End]

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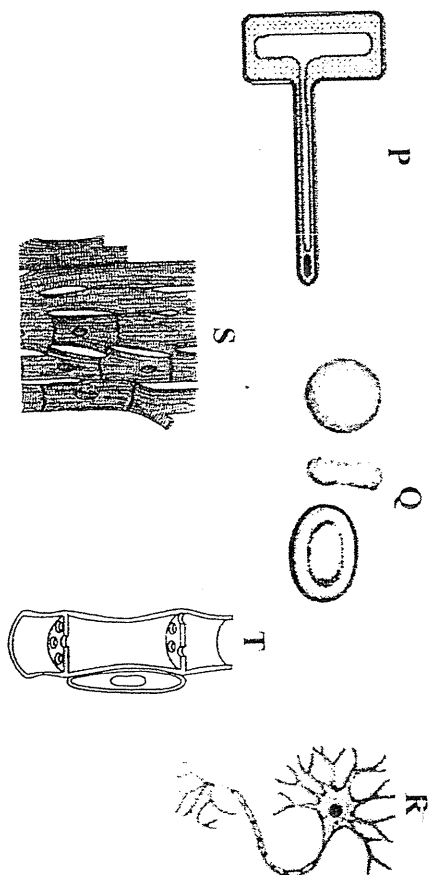Calculators are permitted, however No graphing calculators are allowed.

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This question paper consists of 16 printed pages.

[Turn over

1. The diagrams **P**, **Q**, **R**, **S** and **T** show specialised cells and tissues found in plants and animals. They are not drawn to the same scale.

P   Q   S   T   R

(a) Choose any **FOUR** of the cell types.

For each type of cell or tissue you choose, write the letter then describe its function and name the organ where it is found.

Write your answers in the table.

letter	function of cell or tissue	name of organ where found

2. Element **X** has the atomic number 11 and an atomic mass of 23.

(a) (i) State what these numbers indicate about the element **X**.

atomic number _____

atomic mass _____

[2]

(ii) Draw a diagram showing the electronic structure of element **X**.

[2]

(iii) Element **X** has no overall charge. Explain why.

_____

[1]

(b) The diagram shows part of the Periodic Table. The letters are **NOT** the symbols of the elements.

E							
X	M				U		
Y		S		L	Q	V	T	D

Write the letter which represents an element that

(i) is the lightest; _____

(ii) does not form compounds; _____

(iii) is the most reactive alkaline metal; _____

(iv) has electron configuration of 2,8,2; _____

(v) is a halogen. _____

[5]

TOTAL MARKS [10]

(b) Identify cell U and describe **ONE** way it is structurally adapted to perform its function efficiently.

U
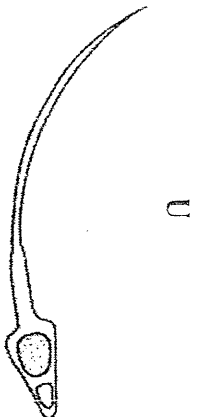
name of cell U _____

adaptation _____

_____

_____

[2]

TOTAL MARKS [10]

3.   The table shows the number of electrons, protons and neutrons in six particles, A to F.

particle	electrons	protons	neutrons
A	7	7	7
B	10	13	14
C	2	2	2
D	13	13	14
E	10	12	12
F	10	8	8

From the table

(a)   Give the letter of a particle that is

(i)   a negative ion;

(ii)   an ion with two positive charges;

_____

(iii)   a noble gas;

_____   [3]

(b)   Give the letters of **TWO** particles that are an atom and an ion of the **same element**.

_____ and _____   [1]

(c)   Give the letters of **ALL** the uncharged particles.

_____   [1]

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(d) The box on the left shows the arrangement of particles in a piece of solid matter which is about to be heated.
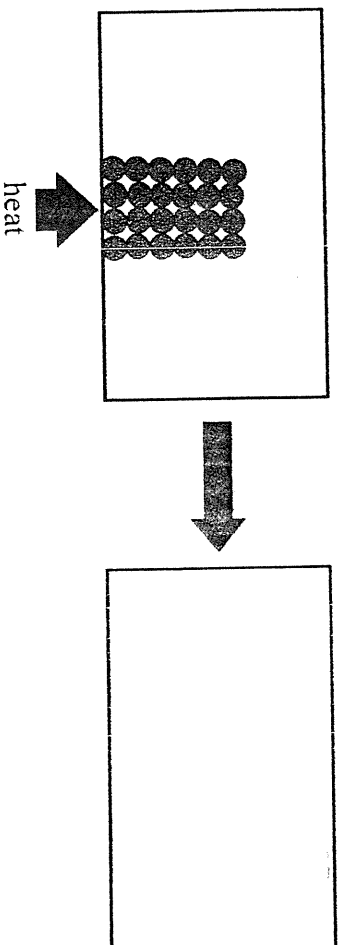
heat

(i) Describe the effect heating will have on the arrangement of these particles.

_____

[2]

(ii) In the empty box, draw the arrangement of the particles after heating.

[1]

(iii) Name the method of heat transfer which takes place in the solid piece of matter.

_____

[1]

(iv) State the name of the theory that explains the behaviour of the particles in matter.

_____

[1]

TOTAL MARKS [10]

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

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

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

(a) Distinguish between the terms mass and weight.

mass _____ [1]

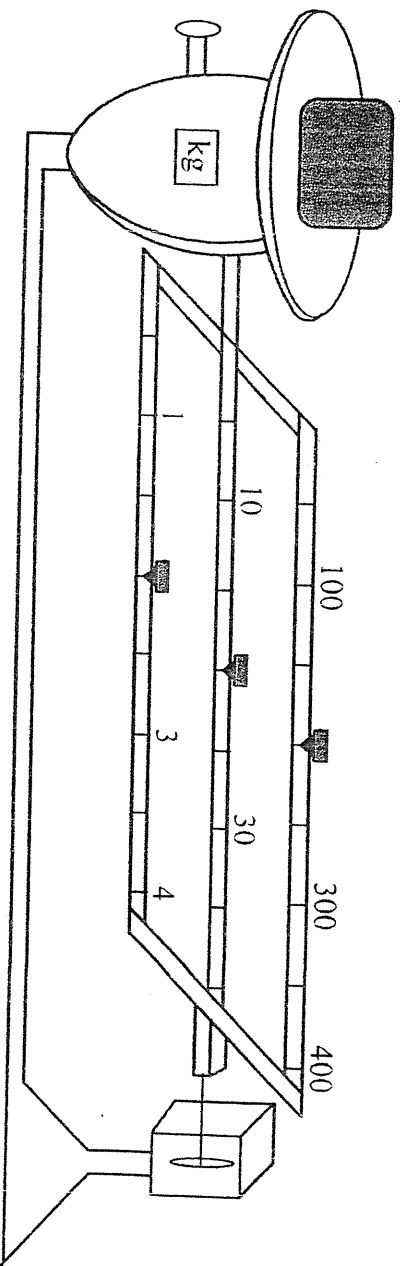weight _____ [1]

(b) This apparatus is used to measure mass.

(i) Name the apparatus.

_____ [1]

(ii) State the value of the mass of the object shown.

_____ [1]

(iii) Find the weight of the object on Earth. (Show working).

[2]

(iv) Find the **mass** and **weight** of the same object on the Moon. Give a reason for your answer in both cases. (Show working).

mass

reason _____ [2]

weight

reason _____ [2]

TOTAL MARKS [10]

5. All living organisms have similar processes.

(a) (i) Write a **word** equation for the process which produces energy in living organisms.

[2]

(ii) Name **TWO** processes that use energy in the body of a living organism.

1. _____

2. _____

[2]

(b) (i) State **THREE** differences in how plants and animals feed.

	plants	animals
1		
2		
3		

[3]

Leaves have special structures which are adapted to make food.

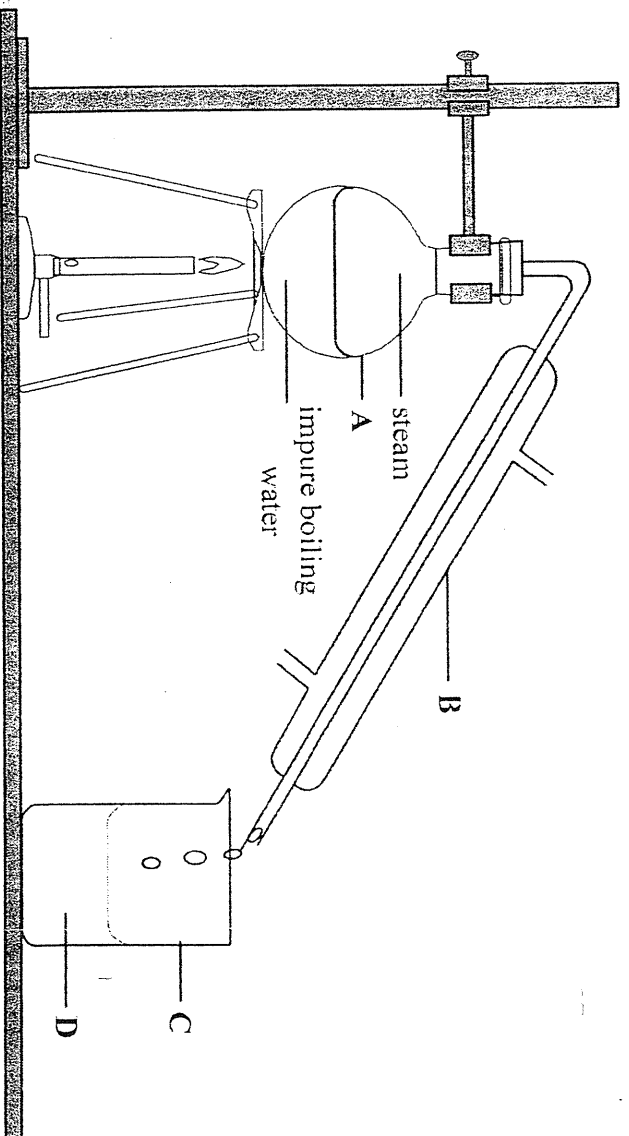(c) Give **THREE** ways that the leaves of a plant are adapted for making food.

1. _____

2. _____

3. _____

[3]

TOTAL MARKS [10]

6. The diagram shows a method used to purify water.

steam ———
A ———
impure boiling water
B
C
D

(a) (i) Name the physical processes happening inside parts **A** and **B**.

   A _____

   B _____

   [2]

   (ii) Suggest the temperature of the steam in the space just above the boiling water.

   _____ [1]

   (iii) Name the part labelled **B**.

   _____ [1]

(b) (i) Using an arrow, label on the diagram where cold water enters part **B**. [1]

   (ii) Give **TWO** reasons why cold water is made to flow in the jacket surrounding part **B**.

   1. _____

   2. _____

   [2]

(c) Give the term used to describe the liquid **D**, which flows out of part
B.

(i) _____ [1]

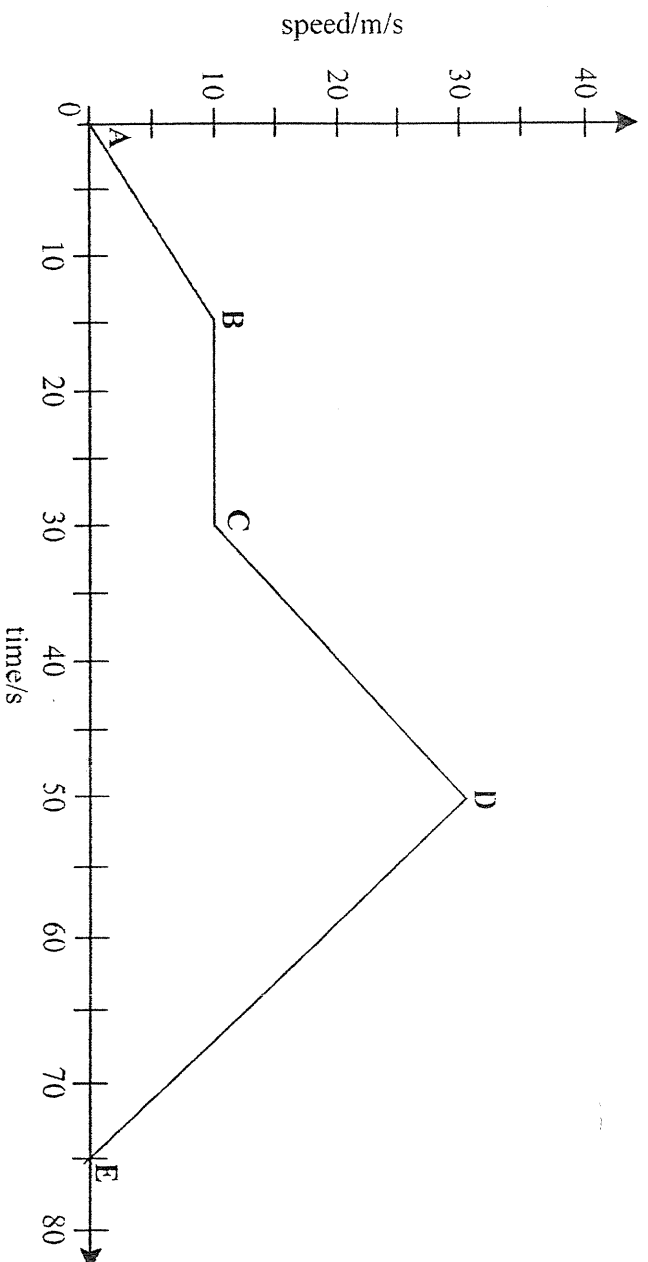(ii) Give **TWO** ways to show that liquid **D** is pure water.

1. _____

2. _____ [2]

TOTAL MARKS [10]

(i) Give the term used to describe the

8. The graph shows the motion of a car between different locations A, B, C, D and E.

speed/m/s

40
30
20
10
0

A B C D E

0 10 20 30 40 50 60 70 80

time/s

(a) Describe the motion of the car from A to B, B to C, C to D and D to E.

(i) A to B;

(ii) B to C;

(iii) C to D;

(iv) D to E;

[2]

(b) Calculate the distance travelled by the car in the first 15 s. (Show working).

[2]

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[Turn over

(c) The mass of the car is 2 000 kg.

(i) Calculate the acceleration of the car at 10 s. (Show working).

[3]

(ii) Calculate the unbalanced force acting on the car at 10 s. (Show working).

[3]

TOTAL MARKS [10]