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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B624/01

**GATEWAY SCIENCE
ADDITIONAL SCIENCE B**

Unit 2 Modules B4 C4 P4 (Foundation Tier)

TUESDAY 7 JUNE 2011: Afternoon

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**Candidates answer on the question paper.
A calculator may be used for this paper.**

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Pencil

Ruler (cm/mm)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**
- **Answer ALL the questions.**

INFORMATION FOR CANDIDATES

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

EQUATIONS

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

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

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

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

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

Answer ALL the questions.

SECTION A – MODULE B4

1 Giles is a farmer.

He grows celery.

(a) Giles waters his celery every day.

(i) Which part of the celery plant takes in water?

_____ [1]

(ii) On a hot day the celery plants lose water quickly.

What would the plants look like if Giles forgot to water them on a hot day?

_____ [1]

(iii) Temperature affects how fast the celery plants lose water.

Write down ONE OTHER factor that affects how fast plants lose water.

_____ [1]

(b) The celery plants need sunlight to grow.

Cells in the leaves absorb sunlight.

Which PART of a cell absorbs sunlight?

_____ [1]

(d) Celery can be preserved by freezing.

(i) It is necessary to preserve food if it is to be kept for a long time.

Why is this?

_____ [1]

(ii) Write down ONE OTHER method of food preservation.

_____ [1]

[Total: 9]

- 2 Read the article about the possibility of people living on the moon.**

CAN WE LIVE ON THE MOON?

One of the main problems with living on the moon is growing food.

There is no soil on the moon but plants could be grown with their roots in water that contains minerals.

However, it is very cold on the moon.

There is also very little of the gas needed for photosynthesis.

The water to grow the plants would have to come from Earth but minerals are not a problem.

There is a wide selection of minerals in moon dust but no microorganisms.

- (a) (i) The article suggests that there are problems with growing plants on the moon.**

Put a tick (✓) next to ONE problem suggested by the article.

not enough nitrates

not enough oxygen for photosynthesis

the temperature is too hot for photosynthesis

not enough carbon dioxide for photosynthesis

[1]

- (ii) Scientists plan to grow the plants in water rather than soil.**

What is the name of this type of growing method?

_____ [1]

- (iii) When people grow plants for food, some parts of the plant are wasted.**

Plant waste will NOT rot on the moon.

Write down TWO reasons why plant waste will not rot.

1 _____

2 _____ [2]

- (iv) Moon dust contains minerals that plants need to grow.**

Write down ONE mineral that is needed for plant growth.

_____ [1]

(b) The scientists investigate a number of different food plants that they might grow.

They use a computer to predict the yield of food plants when grown in water.

The table shows how this yield compares with the yield when grown in soil.

FOOD PLANT	YIELD WHEN GROWN IN SOIL IN ARBITRARY UNITS	YIELD WHEN GROWN IN WATER IN ARBITRARY UNITS	PERCENTAGE OF PLANT THAT CAN BE EATEN
beans	2.4	20.0	22
broccoli	3.8	13.0	33
cabbage	10.8	41.4	67
cucumbers	5.4	65.7	20

Suggest the advantages and disadvantages of choosing cucumbers to grow in water on the moon.

Use data from the table to support your answer.

[3]

[Total: 8]

3 Scientists are developing power stations that do not use fossil fuels.

(a) One possibility is to use biomass as a fuel.

Which TWO of these energy sources are made from biomass?

BIOGAS

URANIUM

WATER

WOOD

answer _____

and _____

[1]

(b) Another alternative to using fossil fuels is using osmosis.

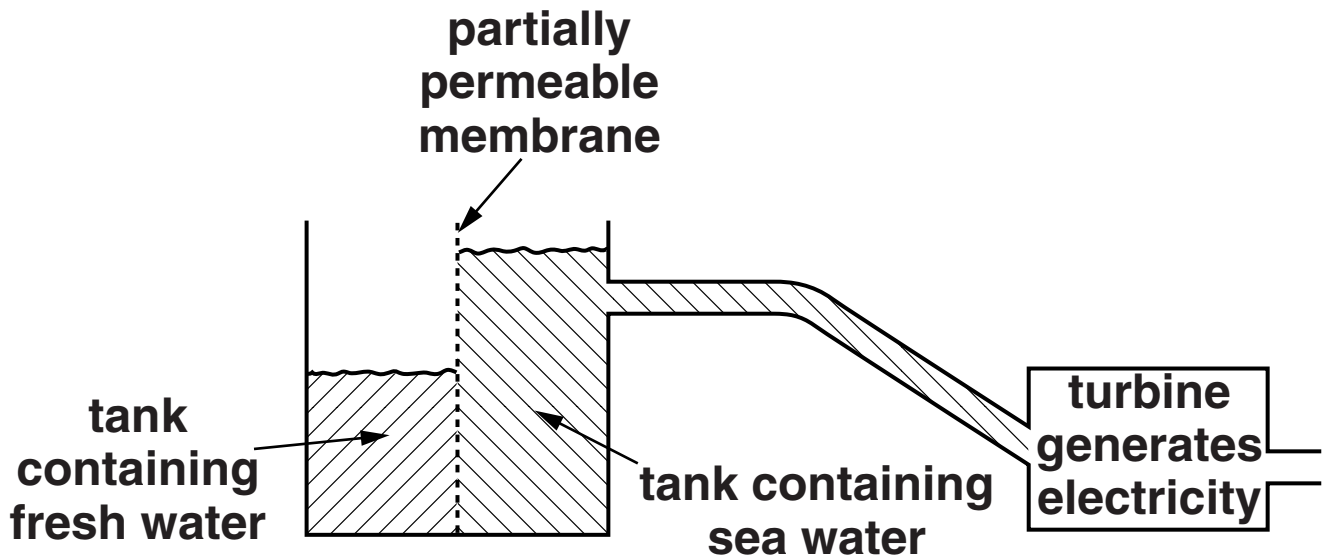
The world's first power station that uses osmosis has opened in Norway.

The station has two large tanks of liquid separated by a partially-permeable membrane.

One tank contains fresh water, the other contains sea water.

Sea water contains a higher concentration of salt than fresh water.

The level in the sea water tank rises and this can be used to generate electricity.



- (i) The power station uses a **PARTIALLY-PERMEABLE** membrane.

What is meant by partially-permeable?

_____ [1]

- (ii) Which statement best describes why the level rises in the sea water tank?

Put a tick (✓) in the box next to the best reason.

Osmosis causes water to move from a dilute salt solution to a concentrated salt solution.

Osmosis causes salt to move from a dilute salt solution to a concentrated salt solution.

Osmosis causes water to move from a concentrated salt solution to a dilute salt solution.

Osmosis causes salt to move from a concentrated salt solution to a dilute salt solution.

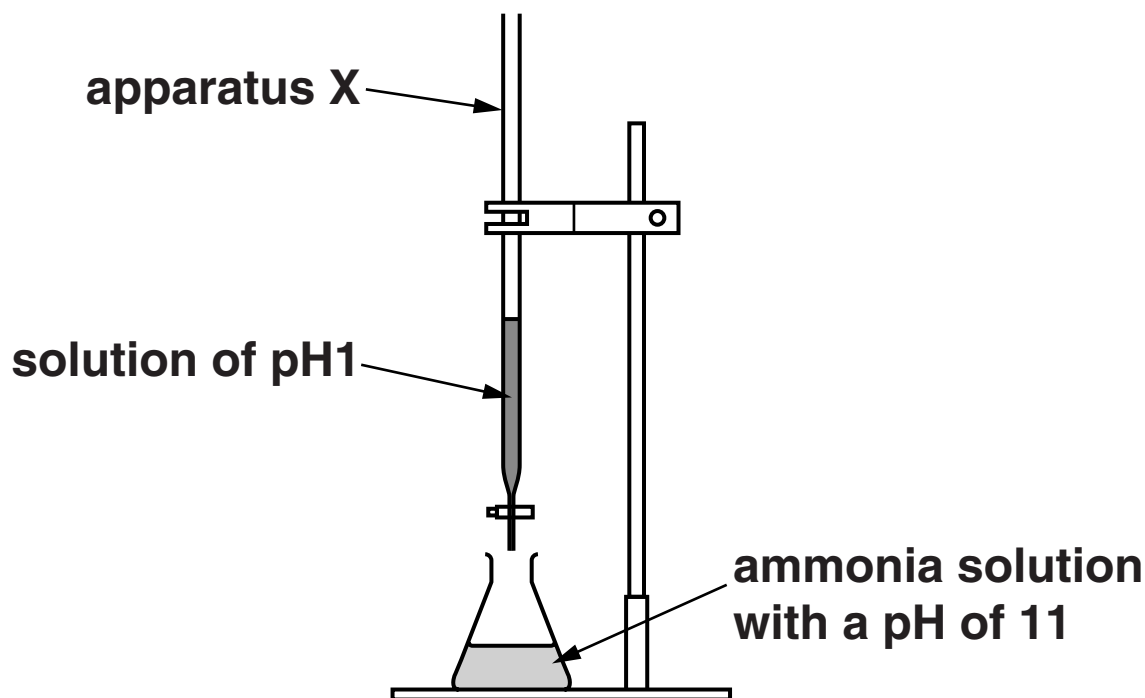
[1]

[Total: 3]

SECTION B – MODULE C4

4 Mary is making a fertiliser.

Look at the diagram. It shows the apparatus she uses.



Mary adds the liquid in apparatus X to the ammonia solution.

She stops adding the liquid when the solution in the flask has a pH of 7.

Mary evaporates the solution in the flask to make the solid fertiliser.

(a) (i) What is the name of apparatus X?

_____ [1]

- (ii) Look at the table. It shows three solutions of different pHs.

Complete the table to show the TYPE of solution.

Choose from

ACID

ALKALI

NEUTRAL

pH OF SOLUTION	TYPE OF SOLUTION
11	
7	
1	

[2]

- (b) The reaction in the flask is a NEUTRALISATION reaction.

Complete the word equation about neutralisation.

acid + base → _____ + water [1]

(c) Mary predicts she will make 4.8 g of fertiliser.

She actually makes 4.2 g.

(i) Calculate her percentage yield.

answer _____ % [2]

(ii) Mary's ACTUAL yield is less than her PREDICTED yield.

Suggest why. Use Mary's method to help you.

[1]

(d) Mary grows vegetables in her garden.

Why does Mary add fertiliser to her vegetable garden?

[1]

[Total: 8]

- 5 Look at the table. It gives some information about two types of manufacturing process.

PROCESS A	PROCESS B
runs only when needed	runs 24 hours a day, 7 days a week
makes chemicals on a small scale	makes chemicals on a large scale
can be used to make medicines	can be used to make ammonia

- (a) Complete the sentences to show the **TYPE** of process.

Process A is a _____ process.

Process B is a _____ process. [2]

- (b) Most medicines are expensive to make.

One of the costs is the cost of the raw materials.

Write about the **OTHER** costs of making medicines.

[3]

[Total: 5]

6 This question is about washing-up liquid and water.

(a) Link each INGREDIENT in washing-up liquid to the JOB IT DOES.

Draw only three straight lines.

INGREDIENT

JOB IT DOES

detergent

**thins out the
detergent**

rinse agent

**softens hard
water**

water

**helps water to
drain off dishes**

**cleans the grease
off dishes**

[3]

(b) Washing-up liquid can pollute drinking water.

Another pollutant is nitrates.

Suggest how nitrates could get into drinking water.

[1]

(c) Joe is testing some water samples.

He adds silver nitrate solution and barium chloride solution to the water samples.

Look at the table. It shows his results.

WATER SAMPLE	RESULT WITH SILVER NITRATE SOLUTION	RESULT WITH BARIUM CHLORIDE SOLUTION
A	white precipitate	colourless solution
B	cream precipitate	colourless solution
C	colourless solution	white precipitate
D	_____	_____

(i) Bromide ions give a cream precipitate with silver nitrate solution.

Which water sample contains bromide ions?

_____ [1]

(ii) Which water sample contains chloride ions?

_____ [1]

(iii) Sample D contains IODIDE ions and SULFATE ions.

Complete the table to show Joe's results. [1]

[Total: 7]

SECTION C – MODULE P4

7 This question is about electrostatics.

Look at the situations below.

One of these situations may cause an electrostatic shock.

- A Gemma rubs a balloon on her sweater and then puts it **NEAR** to a wall.
- B Hazel walks on a vinyl carpet and then **TOUCHES** a cold water tap.
- C Anna plays a game of hockey on a grass pitch and **TOUCHES** a metal goal post.
- D Jackie swims a length of a swimming pool and climbs out by **HOLDING** a metal ladder.

(a) Which situation is most likely to cause an **ELECTROSTATIC SHOCK**?

Choose from A B C D

answer _____

[1]

(b) Kieron combs his hair.

He holds the comb next to some small pieces of paper.

What will happen to the small pieces of paper?

_____ [1]

(c) Lorna wears a nylon coat. The coat becomes charged.

This is because charged particles move between the coat and Lorna.

Write down the NAME of the charged particles involved.

_____ [1]

[Total: 3]

8 Static electricity can be useful.

It is used to restart the heart when it has stopped.

Write about how static electricity is used to restart a heart when it has stopped.

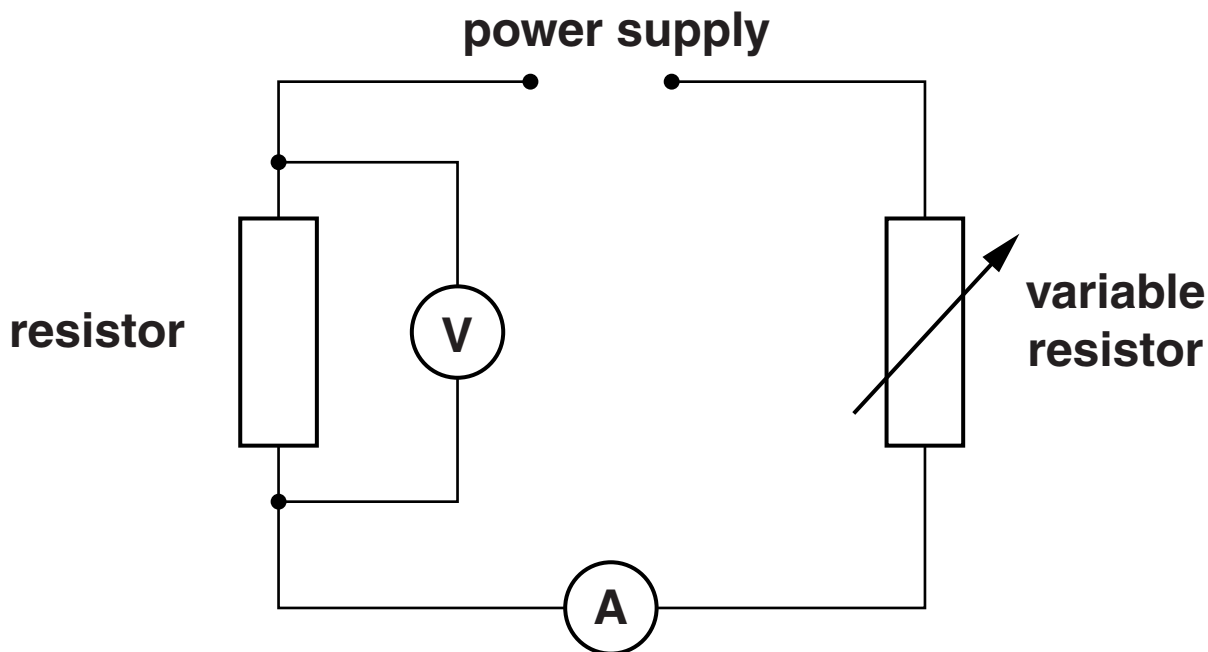
Your answer should include

- **the method used**
- **the safety precautions.**

[3]

[Total: 3]

9 Marc builds the following circuit.



(a) Complete the sentence.

Marc measures the voltage and the current.

Marc needs to change the current in the circuit.

He does this by _____ . [1]

(b) The reading on the voltmeter is 15V and the reading on the ammeter is 4 A.

Calculate the resistance of the resistor.

The equations on page 3 may help you.

answer _____ ohms [2]

[Total: 3]

10 Ultrasound is used in hospitals.

Write down TWO uses of ultrasound in hospitals.

1 _____

2 _____ [2]

[Total: 2]

11 This question is about nuclear radiation.

(a) Gamma rays are used in hospitals.

Write down one use of gamma rays IN HOSPITALS.

_____ [1]

(b) Which PART of an atom gives out gamma rays?

_____ [1]

(c) Atoms that give out nuclear radiation are called radioisotopes.

(i) Write down one use of a radioisotope that produces ALPHA PARTICLES.

_____ [1]

(ii) Scientists need to make radioisotopes.

They have to make the material radioactive.

How do they do this?

_____ [1]

[Total: 4]

12 Look at the simple diagram of a nuclear power station.



(a) Complete the following sentences.

The name of the fuel used in a nuclear power station is

_____ .

The reactor produces a large amount of heat.

This heat causes water in the boiler to produce

_____ .

This passes into the turbine/generator where

_____ is produced.
[3]

(b) The waste products of the nuclear power station are radioactive.

A scientist measures the radioactivity of some waste.

The reading on his meter is 25 000.

(i) What is he measuring?

- A the number of elements in the waste**
- B the number of atoms in the waste**
- C the number of nuclear decays per second**
- D the wavelength of the radiation produced**

Choose from A B C D

answer _____ [1]

(ii) Several years later the scientist measures the radioactivity again.

Which of the following is most likely to be the new measurement on the meter?

- A 41 000**
- B 26 000**
- C 25 000**
- D 19 000**

Choose from A B C D

answer _____ [1]

[Total: 5]

END OF QUESTION PAPER

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