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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)

MONDAY 24 JANUARY 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 printed on the back page.**
- **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 Henry grows vegetables on his allotment.



(a) Henry wants to make compost to provide minerals for his growing plants.

(i) Henry makes compost from dead plant material.

Look at the list of different plant materials.

Which TWO materials decay most easily to make compost?

Put ticks (✓) in the boxes next to the TWO correct answers.

bark chippings

coconut shells

dead leaves

grass cuttings

wooden branches

[2]

(ii) Write down ONE type of living thing that makes dead plant material decay.

_____ **[1]**

(b) Although Henry puts some compost on his allotment, his plants still do NOT grow very well.

Some have yellow leaves.

Henry decides they need more minerals, particularly nitrate.

He goes to a garden centre to buy some artificial fertiliser.

He has a choice of three brands of fertiliser: “Quik Grow”, “Soil Optimum” and “Growth Boost”.

Each has a different NPK value.

The table shows the NPK values of the three fertilisers.

brand of fertiliser	Quik Grow	Soil Optimum	Growth Boost
NPK value	2 : 8 : 11	3 : 5 : 9	5 : 2 : 2

(i) Henry particularly wants nitrate.

Which fertiliser should he choose?

Choose your answer from the table.

_____ [1]

(ii) The fertiliser Henry chooses is a powder.

The instructions on the package tell Henry to mix the fertiliser with water.

Suggest why the fertiliser should be mixed with water.

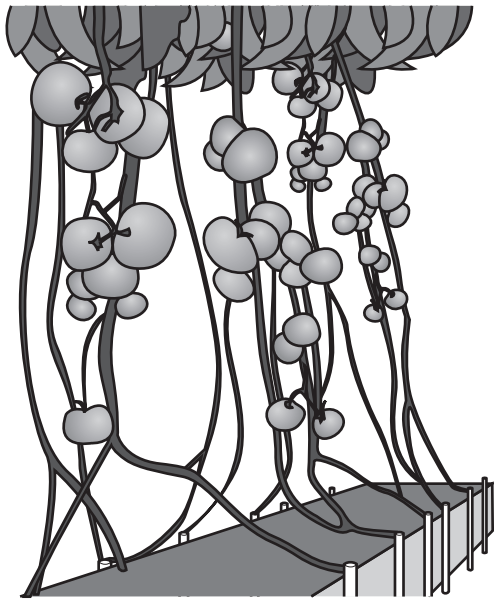
_____ [1]

(iii) Which part of a plant absorbs minerals?

_____ [1]

[Total: 6]

2 Sam grows tomatoes in a glasshouse.



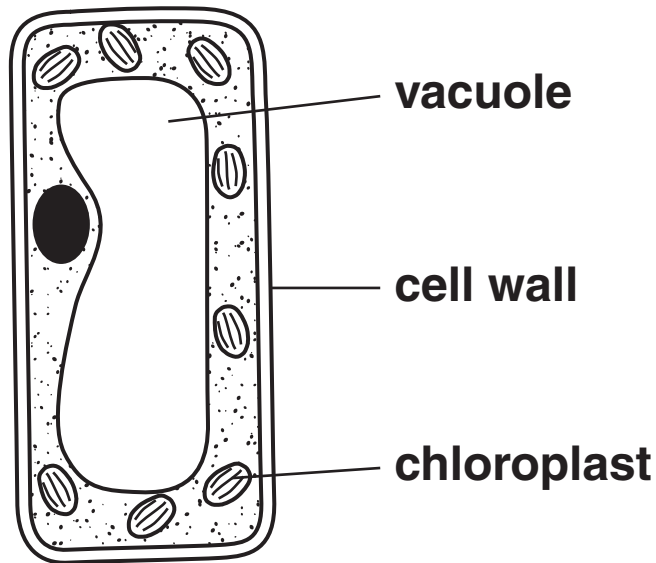
(a) The glasshouse lets in sunlight.

The tomato plants absorb light for photosynthesis.

(i) Why do tomato plants need to photosynthesise?

_____ [1]

- (ii) Look at the diagram of a cell from the leaf of a tomato plant.



Which part of the cell absorbs light for photosynthesis?

Choose your answer from the diagram.

_____ [1]

- (b) Sam keeps the glasshouse warm using gas heaters.

The heaters give out carbon dioxide.

The tomato plants use carbon dioxide for photosynthesis.

Which part of a tomato plant takes in most carbon dioxide?

_____ [1]

(c) Sam's tomato plants do not grow in soil.

Instead, the roots grow in water.

Write down the word which describes this way of growing plants.

_____ [1]

(d) Sam finds insects called greenflies feeding on the tomato plants.

Sam wants to kill the greenflies.

She puts other insects called ladybirds into the glasshouse.

Ladybirds eat greenflies.

(i) Write down the scientific word that describes this way of killing the greenflies.

_____ [1]

(ii) What word describes animals, like ladybirds, that eat other animals?

_____ [1]

(iii) Sam could also use a chemical to kill the greenflies.

Write down the name of this TYPE of chemical.

_____ [1]

[Total: 7]

BLANK PAGE

3 Eucalyptus trees grow in Australia.

They are important for both humans and animals.



(a) Eucalyptus trees grow quickly and the wood can be used as a fuel.

What word describes this type of fuel?

Put a ring around the correct answer.

biogas

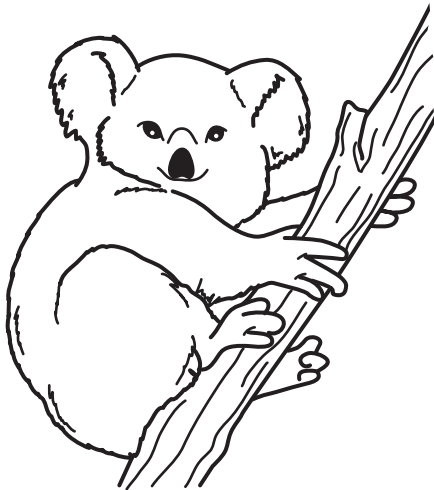
biomass

detritus

fossil fuel

[1]

(b) Animals called koalas feed on eucalyptus leaves.



Koalas need to eat a lot of eucalyptus leaves, about a thousand every day.

Koalas are not very active, resting for about 16–18 hours every day.

Suggest what this information tells us about eucalyptus leaves.

[1]

(c) Eucalyptus trees are sometimes planted to drain swamps and other wet areas.

They remove a lot of water from the ground when they transpire.

Explain how transpiration removes water from the ground.

In your answer, write about

- the parts of a plant through which water moves**
- the processes that make water move.**

[3]

(d) Look at the drawing of eucalyptus leaves.



Describe and explain TWO ways eucalyptus leaves are adapted for efficient photosynthesis.

first adaptation _____

explanation _____

second adaptation _____

explanation _____

_____ [2]

[Total: 7]

SECTION B – MODULE C4

4 Julie buys a new jacket.

Look at the wash label from inside her jacket.



55% POLYESTER

45% VISCOSE

LINING

100% POLYESTER

(a) What **TEMPERATURE** of water should Julie use to wash her jacket?

_____ °C

[1]

(b) Julie uses a washing powder to clean her jacket.

Join each INGREDIENT in the washing powder to the JOB it does.

Draw THREE straight lines.

INGREDIENT	JOB
active detergent	used in low temperature washes to remove food stains
bleaches	does the cleaning
enzymes	removes coloured stains

[2]

(c) The label shows that Julie's jacket can be DRY CLEANED.

What is meant by dry cleaning?

_____ [1]

[Total: 4]

5 This question is about fertilisers.

Look at the picture. It shows a farmer spreading fertiliser on a field.



(a) Write down ONE reason why farmers add fertilisers to their fields.

_____ [1]

(b) A farmer tests a solution of fertiliser with universal indicator.

The pH of the fertiliser is 7.

What does this pH tell you about the fertiliser?

Choose from the list.

it is acidic

it is alkaline

it is neutral

_____ [1]

(c) Ammonium sulfate is a fertiliser.

The farmer has a pond.

He wants to find out if his pond has ammonium sulfate in it.

He tests a sample of pond water with barium chloride solution.

What will he SEE if the pond water contains sulfate ions?

_____ [1]

(d) Ann-Marie makes some ammonium sulfate in a laboratory.

Ann-Marie predicts that she should make 3.5 g of ammonium sulfate.

She actually makes 2.1 g.

Calculate the percentage yield of ammonium sulfate.

percentage yield = _____ % [2]

(e) Look at the table. It shows some information about two fertilisers.

name of fertiliser	formula	relative formula mass, M_r
ammonium nitrate	NH_4NO_3	80
ammonium sulfate	$(\text{NH}_4)_2\text{SO}_4$	_____

Calculate the relative formula mass, M_r , of ammonium sulfate.

Write your answer in the table.

The relative atomic mass, A_r , of N = 14, of H = 1, of S = 32 and of O = 16.

[1]

[Total: 6]

BLANK PAGE

6 This question is about water.

(a) Water is an important resource for many chemical processes in industry.

Write down one USE for water in industrial processes.

_____ [1]

(b) Write down ONE pollutant that may be found in tap water in the home.

Choose from the list.

hydrochloric acid

lead compounds

sodium hydroxide

water softener

_____ [1]

(c) Clean water is very important.

People in developing countries are sometimes not able to get clean water.



Suggest why having clean water is important for people in developing countries.

[1]

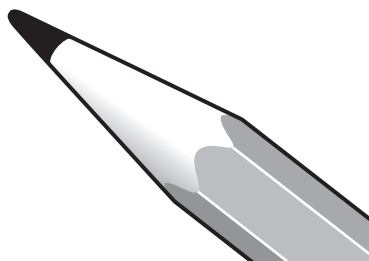
[Total: 3]

- 7 (a) Graphite and buckminster fullerene are two forms of carbon.

Write down the NAME of another form of carbon.

_____ [1]

- (b) Graphite is used to make pencil leads.

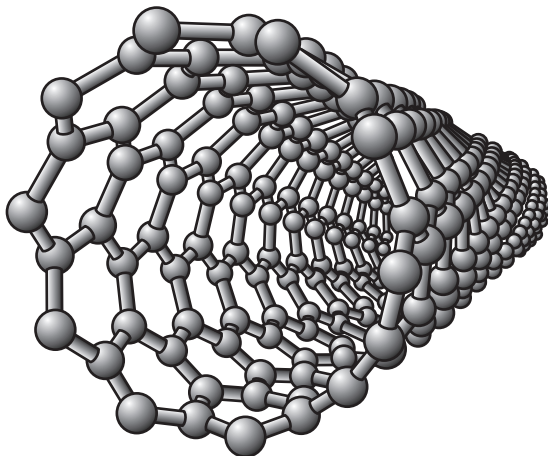


Graphite easily makes marks on paper.

Explain why.

_____ [1]

(c) Fullerenes can be joined together to make nanotubes.



Nanotubes are used to reinforce graphite in tennis rackets.

Write down one PROPERTY of nanotubes.

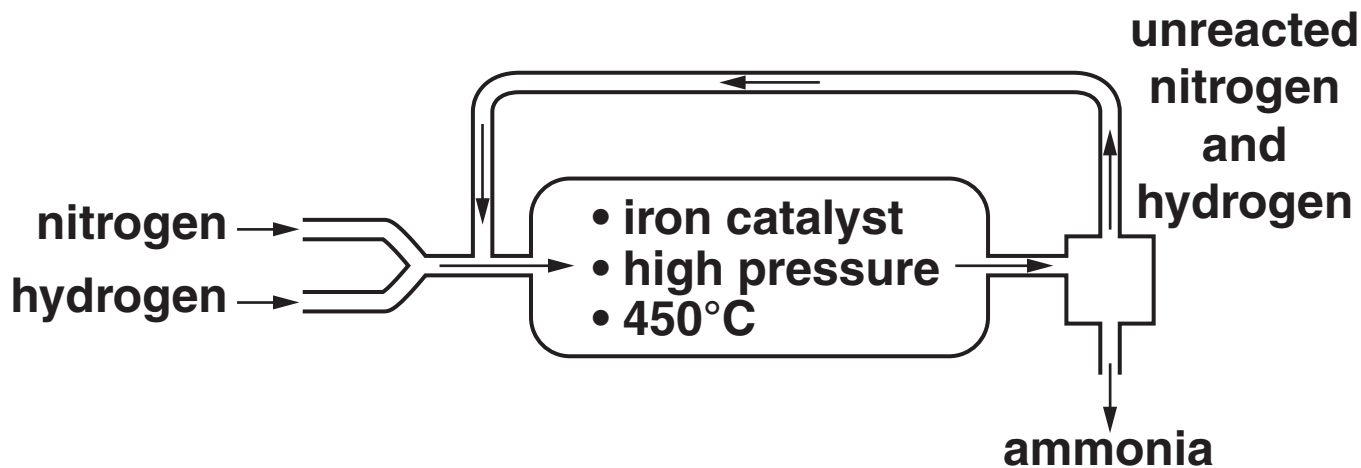
_____ [1]

[Total: 3]

8 This question is about making ammonia.

Ammonia is made by the Haber process.

Look at the diagram. It shows the process used.



Nitrogen reacts with hydrogen to make ammonia.

The equation shows the reaction.



(a) Nitrogen is needed for the reaction.

Where does the nitrogen come from?

_____ [1]

(b) The \rightleftharpoons sign in the equation indicates that the reaction is REVERSIBLE.

What is meant by a reversible reaction?

_____ [1]

(c) There are many costs in making ammonia.

One of these is the cost of the catalyst.

Write about other COSTS of making ammonia.

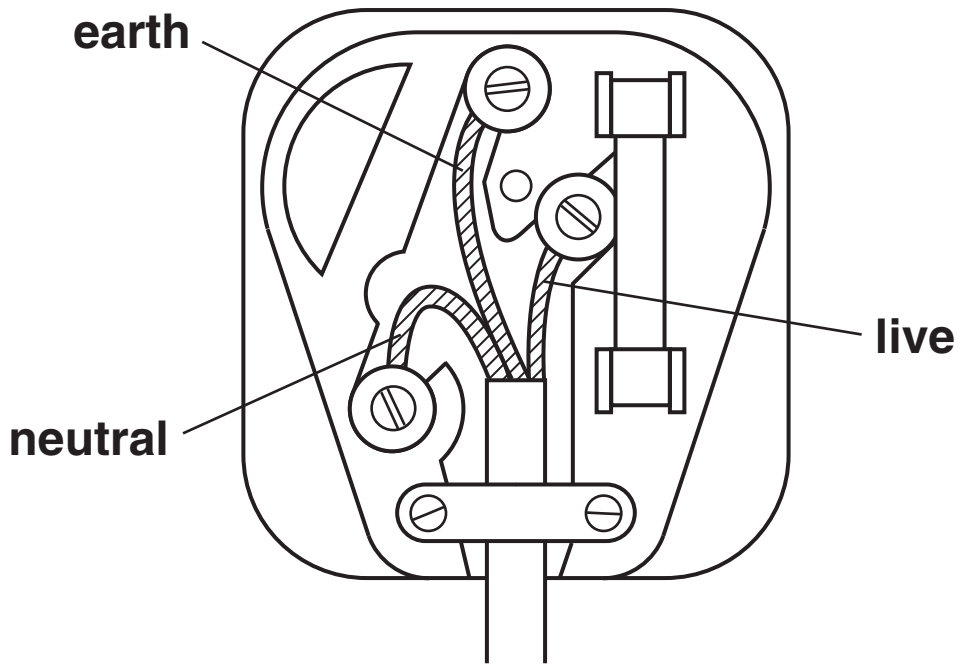
[2]

[Total: 4]

SECTION C – MODULE P4

9 This question is about electric circuits.

(a) Look at the diagram of a plug.



Look at the table.

line	live	neutral	earth
A	brown	blue	green/yellow
B	blue	green/yellow	brown
C	green/yellow	brown	blue
D	blue	brown	green/yellow

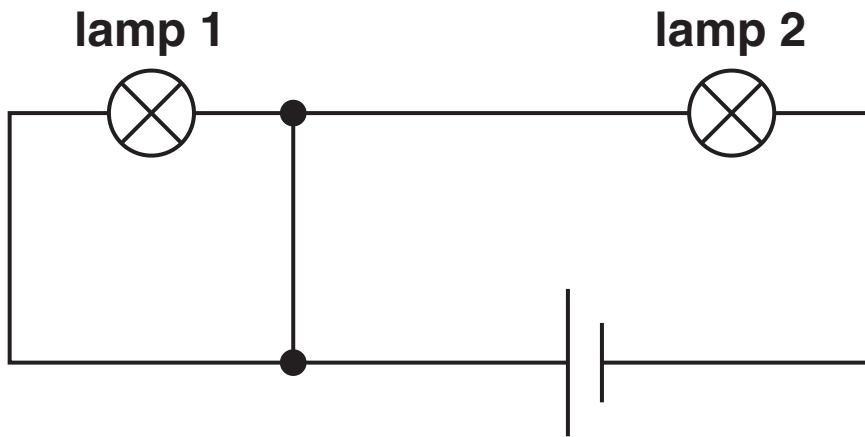
Which line shows the correct colours for the wires?

Choose from A B C D

answer _____

[1]

(b) Andrew builds a circuit.



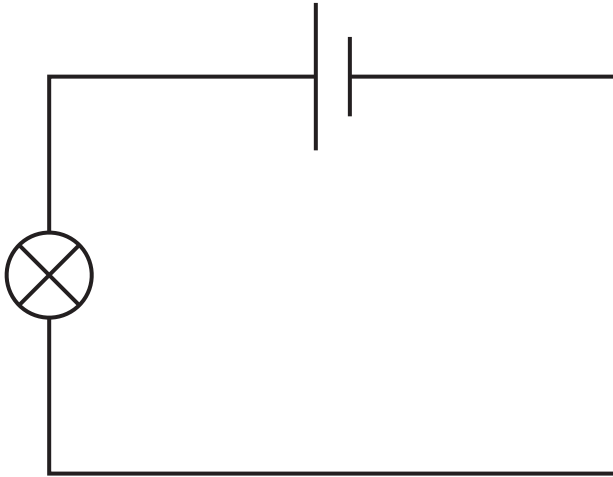
Lamp 1 does not light up.

It is NOT broken.

Why does lamp 1 not light up?

[1]

(c) Andrew connects another circuit.



He wants to make the lamp less bright by REDUCING the current.

What electrical component should he add to the circuit?

answer _____ [1]

(d) Doug measures the current and voltage for a torch bulb.

Look at his results.

current in amps	voltage in volts
0.25	1.5

Calculate the resistance of the torch bulb.

The equations on page 3 may help you.

answer _____ ohms [2]

[Total: 5]

10 This question is about electrostatic charge.

(a) There are two types of electrostatic charge.

These are called _____ and

_____ .

[1]

(b) Alice gets an electrostatic shock when she takes off her jumper.

Explain why.

In your answer write about

- what type of material becomes charged**
- how the jumper becomes charged**
- why she gets an electrostatic shock.**

[3]

(c) Electrostatic charges can be useful in paint spraying and removing dust from chimneys.

Write down one OTHER use of electrostatic charge.

[1]

[Total: 5]

11 This question is about ultrasound.

Ultrasound is a longitudinal wave.

(a) Look at the list of features and descriptions of LONGITUDINAL waves.

Draw a straight line from each FEATURE to its correct DESCRIPTION.

Two have been done for you.

FEATURE	DESCRIPTION
amplitude	maximum displacement of each particle
wavelength	region where particles in the wave are far apart
frequency	region where the particles in the wave are close together
compression	number of vibrations each second
rarefaction	shortest distance between two particles moving identically

[2]

(b) Ultrasound is used in hospitals for body scans.

Humans can hear sounds between frequencies of 20 Hz and 20 000 Hz.

What is the approximate frequency of ultrasound waves?

Choose from

28 Hz

180 Hz

2800 Hz

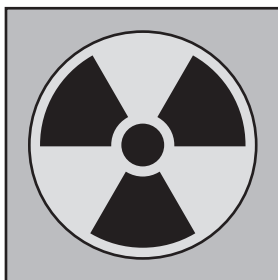
18 000 Hz

28 000 Hz

answer _____ Hz [1]

[Total: 3]

12 (a) Radioactivity can be useful.



Some radioactive materials emit alpha particles.

(i) Which part of an atom emits alpha particles?

_____ [1]

(ii) Some radioactive materials are used as tracers in hospitals.

Radioactive materials which emit alpha particles cannot be used as tracers.

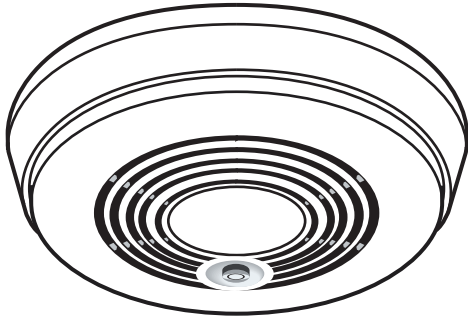
Explain why.

_____ [1]

(iii) What happens to the radioactivity of the tracer over a period of a week?

_____ [1]

(b) Look at the picture of a smoke alarm.



Which type of radiation is used in a smoke alarm?

Choose from ALPHA BETA GAMMA

answer _____

[1]

[Total: 4]

13 Nuclear power stations use uranium as fuel.

Energy is produced in a nuclear reactor when a uranium atom splits.

(a) Write down the name of this process.

_____ [1]

(b) Metals can be made radioactive.

This happens when they ABSORB particles inside a nuclear reactor.

Write down the name of the particles absorbed.

_____ [1]

(c) Nuclear power stations contribute to background radiation.

What is background radiation?

_____ [1]

[Total: 3]

END OF QUESTION PAPER

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