

Wednesday 30 May 2012 – Afternoon

**GCSE TWENTY FIRST CENTURY SCIENCE
ADDITIONAL SCIENCE A**

A218/01 Unit 4: Ideas in Context (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

Duration: 45 minutes

OCR supplied materials:

- Insert (inserted)

Other materials required:

- Pencil
- Ruler (cm/mm)




Candidate forename		Candidate surname	
-----------------------	--	----------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

INSTRUCTIONS TO CANDIDATES

- The Insert will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **40**.
- A list of physics equations is printed on page 2.
- The Periodic Table is printed on the back page.
-  Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- This document consists of **12** pages. Any blank pages are indicated.

TWENTY FIRST CENTURY SCIENCE EQUATIONS

Useful Relationships

Explaining Motion

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

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$\text{change of momentum} = \text{resultant force} \times \text{time for which it acts}$$

$$\text{work done by a force} = \text{force} \times \text{distance moved in the direction of the force}$$

$$\text{change in energy} = \text{work done}$$

$$\text{change in GPE} = \text{weight} \times \text{vertical height difference}$$

$$\text{kinetic energy} = \frac{1}{2} \times \text{mass} \times [\text{velocity}]^2$$

Electric Circuits

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

$$\frac{\text{voltage across primary coil}}{\text{voltage across secondary coil}} = \frac{\text{number of turns in primary coil}}{\text{number of turns in secondary coil}}$$

$$\text{energy transferred} = \text{power} \times \text{time}$$

$$\text{power} = \text{potential difference} \times \text{current}$$

$$\text{efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$$

The Wave Model of Radiation

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

BLANK PAGE

Question 1 starts on page 4

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

1 This question is based on the article ‘Hypothermia – a hazard for mountaineers’.

(a) A person gets hypothermia if their core body temperature drops below a certain temperature.

(i) What is this temperature?

answer °C [1]

(ii) Shivering occurs during mild hypothermia.

Explain how shivering raises the core temperature of the body.



One mark will be for writing in sentences with correct spelling, punctuation and grammar.

.....

 [2+1]

(iii) Temperature regulation in the human body is an example of homeostasis.

What is homeostasis?

.....
 [1]

(iv) Temperature receptors are found in different parts of the body.

Complete the table to show where the temperature receptors are found.

receptors for the detection of temperature ...	location
... outside the body
... of the blood

[2]

(b) There are three stages of hypothermia described in the article.

(i) Ann is a mountaineer. Her core body temperature is 31 °C.

Which stage of hypothermia has she got?

Put a **ring** around the correct answer.

mild moderate severe

[1]

(ii) Look at the following data.

140 mountaineers climb a mountain range.
14 develop some form of hypothermia.
7 of the hypothermia patients have a core body temperature below 28 °C.

What percentage of the 140 mountaineers have **severe** hypothermia?

Show your working.

answer = % [2]

(c) The article gives advice to help avoid hypothermia.

Explain why wearing wet clothes increases the risk of getting hypothermia.

.....
.....
.....
..... [2]

(d) Respiration is a chemical reaction.

This reaction is controlled by enzymes.

Explain why severe hypothermia is so dangerous to the body.

.....
.....
.....
..... [2]

[Total: 14]

Turn over

2 This question is based on the article 'The dangers and delights of chlorine and bromine'.

- (a) Chlorine, bromine and iodine are all elements in group 7.

Some of their properties are shown in the table.

element	melting point in °C	boiling point in °C	density in g/cm ³
chlorine	-101	-34	0.003
bromine	-7	59	3.1
iodine	114	184	4.9

- (i) Which element, chlorine, bromine or iodine, has the highest density?

..... [1]

- (ii) How does the melting point of the elements change down group 7?

..... [1]

- (b) At room temperature, iodine is a grey element in the solid state.

- (i) Describe the **colour** and **state** of chlorine and bromine at room temperature.

.....
 [2]

- (ii) The article discusses why a large spillage of chlorine is more hazardous than a large spillage of bromine.

Suggest **two** reasons why.

.....

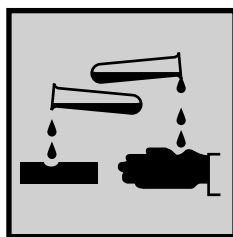
 [2]

- (iii) If a large chlorine spillage happens, hospitals need to know what type of health problems to expect.

Give **two** health problems, other than death, that chlorine causes.

1
 2 [1]

(c) This is one of the hazard symbols for bromine.



(i) What type of hazard does this warning show?

..... [1]

(ii) Some workers are specially trained to work with bromine.

They always wear a lab coat and goggles.

Give **two** other safety precautions that workers should take when they work with bromine.

1

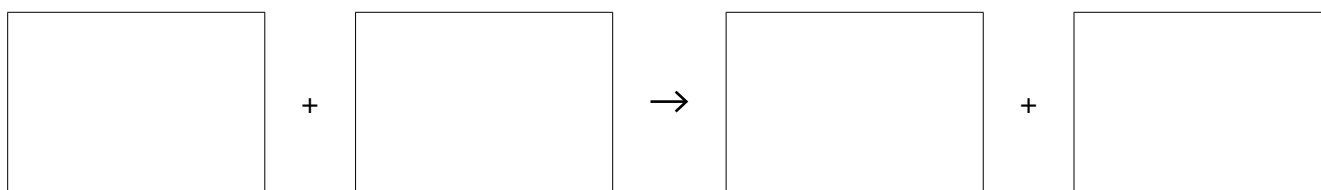
2 [1]

(d) Bromine is made when chlorine reacts with sodium bromide.

The article gives an equation for this reaction.

Iodine can be made from sodium iodide in the same way.

Fill in the boxes to show a **word** equation for the reaction that happens when chlorine reacts with sodium iodide to make iodine.



[2]

(e) The article shows the structure of a chlorine atom.

(i) How many electrons are in one chlorine atom?

answer = [1]

(ii) Fluorine is at the top of group 7.

The arrangement of electrons in a fluorine atom is shown below.

fluorine	2.7
----------	-----

Fill in the box to show the arrangement of electrons in a **chlorine** atom. [1]

chlorine	
----------	--

[Total: 13]

3 This question is based on the article 'The National Grid'.

(a) At peak times large power stations together produce a total power of 63 Gigawatts.

The article states that there are 181 large power stations supplying electricity to the National Grid.

On average how much power is each large power station producing at peak times?

average power = Gigawatts [1]

(b) The electrical power from a power station is produced by generators.

Suggest two ways that the output voltage of a generator could be increased.

.....
..... [2]

(c) (i) There are power losses in the National Grid.

How do power losses in the transformers compare to power losses in the cables?

Include numbers in your answer.

.....
.....
..... [2]

(ii) Why is energy lost in the cables of the National Grid?

.....
.....
..... [2]

(d) Complete the sentence about mains electricity.

Choose words from this list.

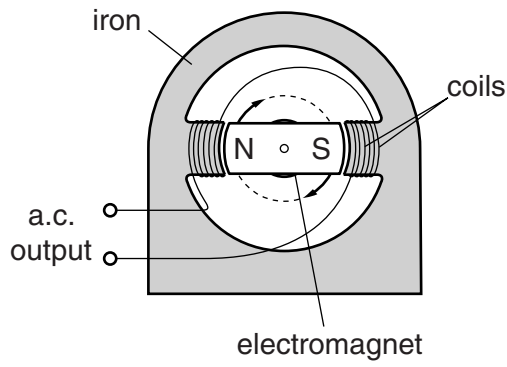
available alternating digital direct 230 11 k 275 k 400 k

The mains supply to our homes is current and has a voltage of

..... V. [2]

(e) Describe and explain how this generator produces electricity.

Use the diagram to help you.



.....

.....

.....

.....

..... [4]

[Total: 13]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

