

**Tuesday 12 June 2012 – Morning**

**GCSE APPLIED SCIENCE: DOUBLE AWARD J649**

**B482/02** Unit 2: Science for the needs of society (Higher Tier)

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

**Duration: 1 hour**

**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- 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 **60**.
- The marks allocated and the spaces provided are a good indication of the length of answers required.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

1 In February 2010, the last steelworks in Britain closed down.

Many local people protested against the closure.



(a) Give one advantage and one disadvantage to local people after the steelworks closed.

advantage .....

disadvantage ..... [2]

(b) Some of the people who worked at the steelworks were scientists.

What jobs at the steelworks must be done by scientists?

Put ticks (✓) in the boxes next to the **two** best answers.

research and development of new processes

selling the steel to customers

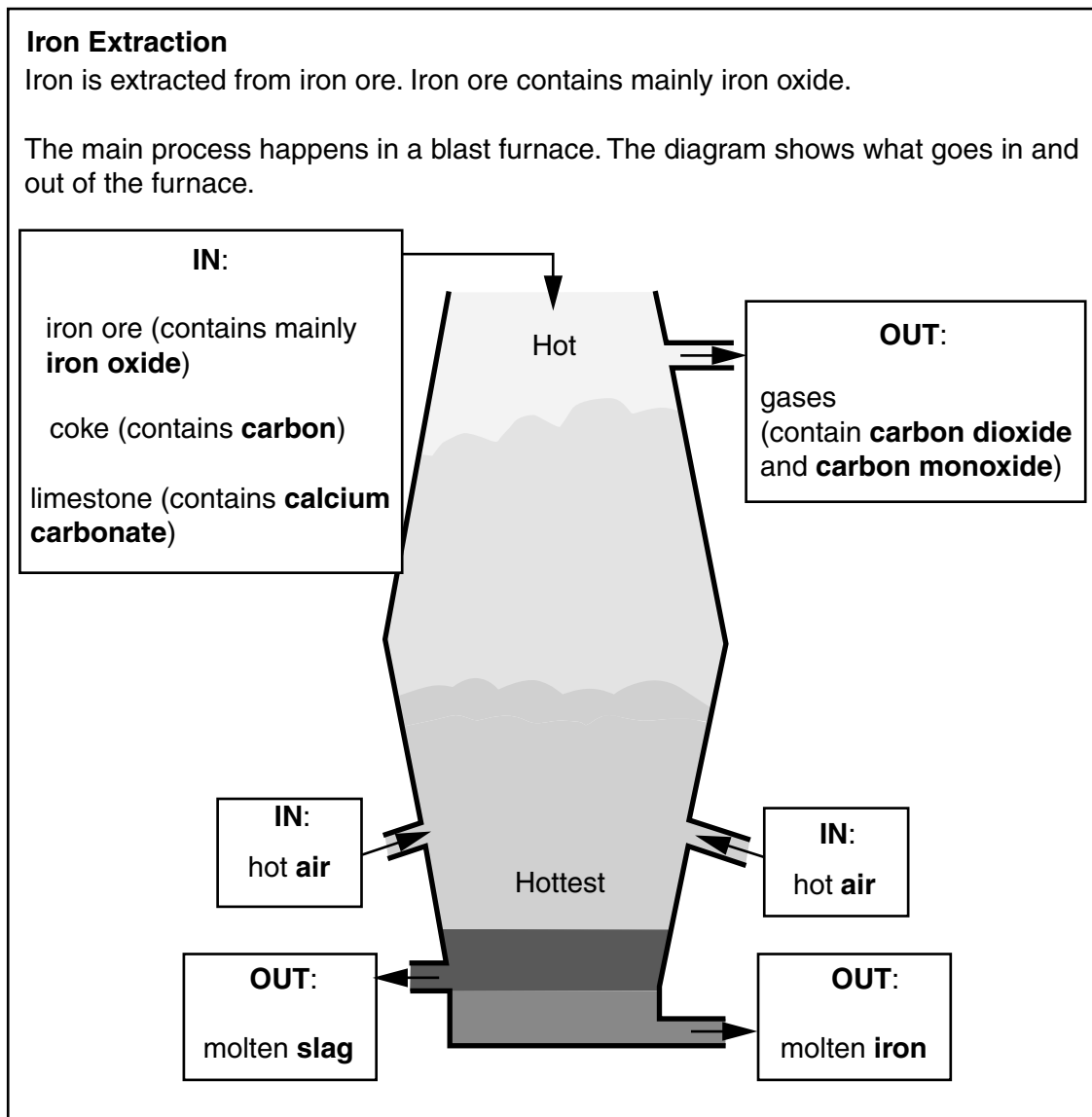
checking the quality of the steel

interviewing new office employees

arranging the transport of the steel around the country

[1]

- (c) The information in the box explains how the iron used to make steel was extracted from iron ore.



Give the name of one **element**, one **compound** and one **mixture** from the diagram.

element .....

compound .....

mixture .....

[1]

(d) The process uses iron ore.

What is an ore?

Put a tick (✓) in the box next to the correct answer.

pure metal

a pure metal compound

a mixture of a mineral with waste rock

a solution of a metal compound

[1]

(e) In a blast furnace, iron oxide reacts with carbon monoxide.

(i) During the reaction the carbon monoxide gas is oxidised.

What is the name of the waste gas that is made in the reaction?

..... [1]

(ii) Write a word equation for the reaction between carbon monoxide and iron oxide.

..... [1]

(f) The information mentions several different substances.

Draw straight lines to join the correct **name** of each substance with its correct **formula**.

name	formula
iron	$\text{CaCO}_3$
calcium carbonate	$\text{Fe}_2\text{O}_3$
iron oxide	$\text{CO}_2$
carbon dioxide	CO
	Fe

[2]

(g) Which other metal can be extracted by heating its ore with carbon?

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

**aluminium**

**lead**

**sodium**

**magnesium**

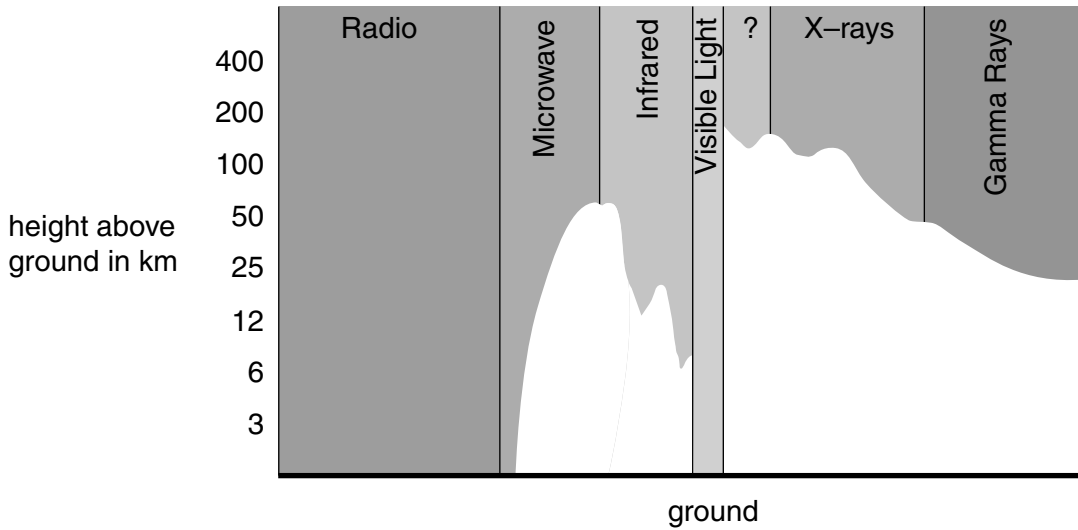
[1]

[Total: 10]

2 Trish works at an astronomical observatory.

- (a) She says the atmosphere is a real nuisance because it absorbs some types of electromagnetic radiation. This means we have to send some types of telescope into space to detect certain parts of the electromagnetic spectrum.

She sketches a graph to show how well each type of electromagnetic radiation gets through the atmosphere.



Use the graph to help you answer the following questions.

- (i) Which types of electromagnetic radiation reach the Earth's surface?  
 ..... and ..... [2]
- (ii) Suggest two types of telescope that could only be used in space.  
 ..... and ..... [2]
- (iii) Which part of the electromagnetic spectrum is not labelled on the graph?  
 ..... [1]

- (iv) What is the difference between ultraviolet waves and radio waves in the electromagnetic spectrum?

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

radio waves have a longer wavelength than ultraviolet waves

radio waves can be seen by the human eye, ultraviolet waves cannot

ultraviolet waves have a higher frequency than radio waves

ultraviolet waves have a larger wavelength than radio waves

radio waves don't have a frequency, ultraviolet waves do

radio waves and ultraviolet waves travel at different speeds through space

[2]

- (b) (i) Trish uses a telescope to look at objects outside the solar system.

Write down two types of astronomical object outside the solar system that Trish might look at.

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

- (ii) As an astronomer, Trish often uses the unit **light-year**.

What is a light-year a unit of?

Put a tick (✓) in the box next to the correct answer.

brightness

distance

spectrum

time

[1]

[Total: 10]

3 Bakers use yeast to produce bread.

The yeast results in the bread rising.

The yeast ferments the glucose in the bread which produces carbon dioxide gas.

(a) (i) Write down the **symbol** equation for fermentation.

[3]

(ii) Two conditions needed for fermentation are

- an absence of oxygen
- a warm temperature, but not above 50 °C.

Explain why each of these is important for fermentation.

an absence of oxygen .....

.....

warm temperature below 50 °C .....

.....

..... [3]

(b) Cells can divide by meiosis or mitosis. Yeast cells divide by mitosis.

For each of the following statements, decide whether it is to do with meiosis, mitosis, both or neither.

Put one tick (✓) in a box for each statement.

	mitosis	meiosis	both	neither
produces only two daughter cells				
produces cells with chromosomes				
produces gametes				
produces cloned cells				

[4]

[Total: 10]

4 Ben works for a company that produces metals.

The table shows information about some of the metals that are produced by the company.

metal	atomic mass	melting point in °C	electrical conductivity in MS/m	density in g/cm <sup>3</sup>	cost
aluminium	27	660	38	2.70	high
silver	108	961	62	10.5	very high
iron	56	1535	10	7.90	medium
copper	64	1083	59	8.90	high

(a) The company makes electrical wiring.

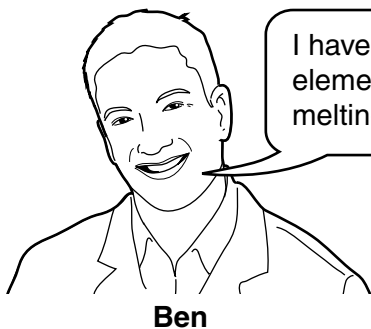
Copper is used in cables for electrical wiring in houses.

Explain why copper is the best choice for electrical wiring in houses.

.....

..... [2]

(b) Ben talks about the information in the table.



I have noticed some patterns in the table. I have noticed that elements with higher atomic masses tend to have higher melting points and densities.

Is Ben correct? Use information from the table to justify your answer.

.....

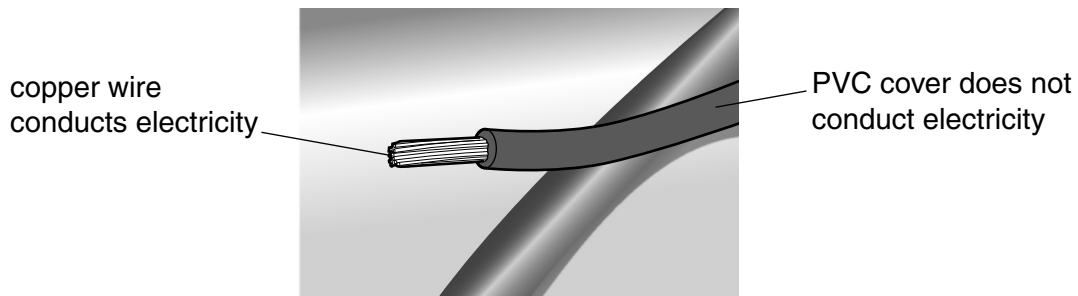
.....

.....

..... [2]



- (c) Copper wiring for houses is insulated with a thermoplastic polymer covering, such as PVC.



One difference between the properties of copper and PVC is that copper conducts electricity and PVC does not.

- (i) The table shows some other differences between copper and PVC.

Put a tick (✓) in the correct box in each row to show whether the statement applies to **copper** or **PVC**.

	<b>copper</b>	<b>PVC</b>
has a higher melting point		
is more dense		
may corrode		
can catch fire and burn		

[2]

- (ii) Ben knows that the metal and the polymer have different types of bonding.

Draw a straight line to connect each **material** with the correct **type of bonding**.

Then draw another straight line to join each **type of bonding** with the correct **description**.

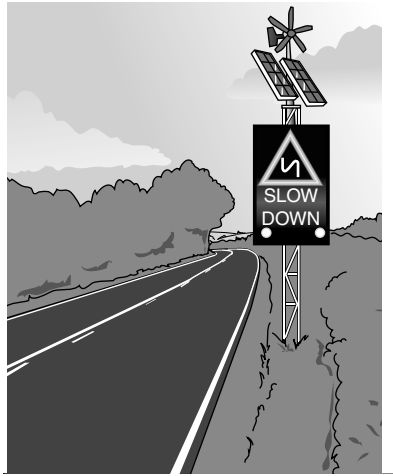
<b>material</b>	<b>type of bonding</b>	<b>description</b>
copper	ionic	atoms held together by shared electrons
	covalent	atoms transfer electrons and are held together by opposite charges
polymer	metallic	positive ions in a 'sea' of electrons

[2]

[Total: 8]

5 A new road sign has been put up near Andrew's house.

The sign lights up when a car is coming towards it.



(a) The sign is powered by a solar panel and a wind turbine.

(i) What are the advantages of using solar and wind power rather than mains electricity?

.....  
.....  
.....  
..... [3]

(ii) The sign must also have a battery.

Explain why.

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

(iii) The sign only lights up when it detects a car coming towards it.

Explain why it is designed to do this.

..... [1]

(b) The lights used in the sign are LEDs rather than filament bulbs.

(i) Why are LED lights used in the sign?

..... [1]

(ii) The LEDs produce 30W of light.

Calculate the amount of energy used if the LEDs are on for 15 seconds.

Use the formula.

$$\text{power} = \frac{\text{energy}}{\text{time}}$$

Show your working.

energy = ..... joules [3]

(iii) The battery is a 12V battery.

Calculate the current needed to provide the 30W.

Show your working.

current = ..... amps [3]

(iv) Why is your answer to part (iii) less than the actual current needed by the LEDs?

..... [1]

[Total: 14]

6 (a) Tuberculosis (TB) is a highly infectious disease that can be fatal.

During the 1950s, an antibiotic was found that was effective against TB.

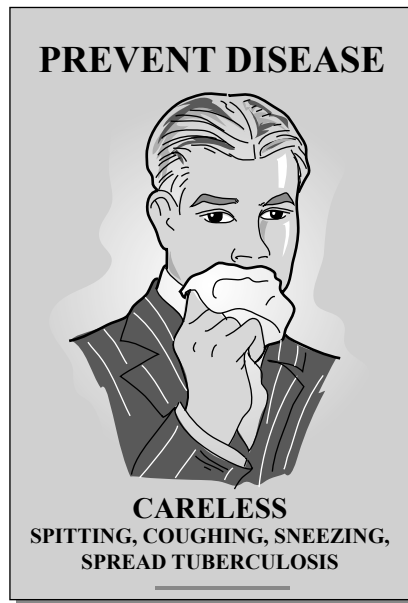
(i) What type of microorganism causes tuberculosis?

..... [1]

(ii) How does the information show that tuberculosis is not caused by a virus?

..... [1]

(b) Before the 1950s, tuberculosis caused so many deaths that posters were produced to try and prevent TB spreading.



Explain how coughing can spread the disease.

.....  
.....  
..... [3]



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