

F

# Wednesday 25 May 2016 - Afternoon

# GCSE GATEWAY SCIENCE SCIENCE B

**B711/01** Science modules B1, C1, P1 (Foundation Tier)

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)

**Duration:** 1 hour 15 minutes



Candidate forename				Candidate surname			
Centre number				Candidate nu	ımber		

### **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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do not write in the bar codes.

# **INFORMATION FOR CANDIDATES**

- The quality of written communication is assessed in questions marked with a pencil ( ).
- A list of equations can be found on page 2.
- The Periodic Table can be found on the back page.
- 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 75.
- This document consists of 24 pages. Any blank pages are indicated.

### **EQUATIONS**

energy = mass x specific heat capacity x temperature change
energy = mass x specific latent heat

efficiency = 
$$\frac{\text{useful energy output (x 100\%)}}{\text{total energy input}}$$

wave speed = frequency × wavelength

power = voltage × current

energy supplied = power x time

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

distance = average speed x time

$$s = \frac{(u+v)}{2} \times t$$

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

force = mass x acceleration

weight = mass x gravitational field strength

work done = force  $\times$  distance

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

 $power = force \times speed$ 

$$KE = \frac{1}{2}mv^2$$

momentum = mass x velocity

$$force = \frac{change \ in \ momentum}{time}$$

$$GPE = mgh$$

$$mgh = \frac{1}{2}mv^2$$

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

3 BLANK PAGE

Question 1 begins on page 4

PLEASE DO NOT WRITE ON THIS PAGE

© OCR 2016 Turn over

4

# Answer all the questions.

### **SECTION A - Module B1**

- 1 This question is about drugs.
  - (a) Finish the sentences about drugs.

Choose words from this list.

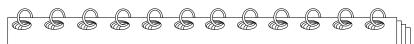
	depressants	pain killers	stimulants	
	performance enhan	ncers ha	llucinogens	
	Drugs that slow down brain activity ar	re called		
	Drugs that distort what you see or hea	ar are called		
<b>)</b>	Women are advised to drink no more	than <b>14 units</b> of	alcohol each week.	[2]

(b) Women are advised to drink no more than **14 units** of alcohol each week.

Look at the table.

Drink	Amount	Units of alcohol
beer	one pint	2.3
gin and tonic	one measure	1.0
cider	one pint	2.6
wine	one glass	3.0
whisky	one measure	1.0

Connie writes down all the alcoholic drink she has in one week.



Monday - one glass of wine

Tuesday - none

Wednesday - none

Thursday - two glasses of wine

Friday - two glasses of wine, one measure of whisky

Saturday - two gin and tonics

Sunday - one glass of wine

Connie has drunk more than the advised amount.

Calculate by how much she is over the advised amount.

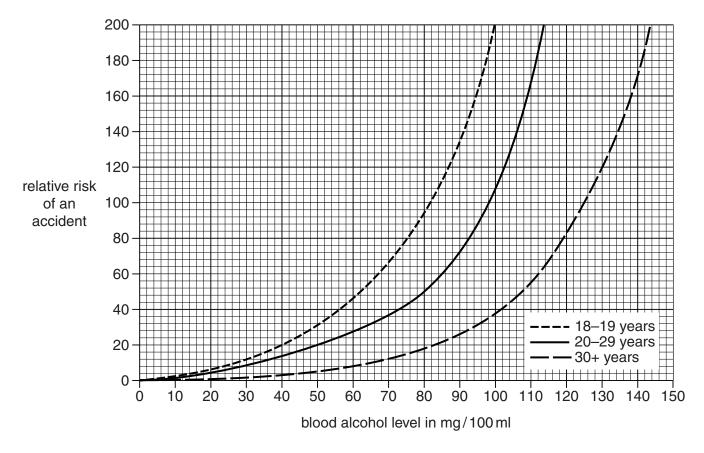
answer ..... units

[2]

(c) Connie is concerned about drinking alcohol.

She researches the effects of alcohol and finds this graph below.

It shows the relative risk of having an accident if you drink alcohol and drive.



Connie writes down some conclusions about the graph.

Put ticks (✓) next to **two** conclusions that best match the graph.

20–29 year olds reduce the relative risk of an accident by 30 if they have blood alcohol level of 50 mg/100 ml instead of 80 mg/100 ml.	
Only those aged 18–19 will have an accident with a blood alcohol level of 10 mg/100 ml.	
People over 30 are 20 times better drivers than people in other age groups.	
People with a blood alcohol level of 150 mg/100 ml are at least 200 times more likely to have an accident than people with no alcohol in their blood.	
The lower the blood alcohol level the more likely you are to have an accident.	
	[2]

[Total: 6]

**Turn over** 

© OCR 2016

6

2	This	s que	estion is about insulin.
	(a)	Wri	te down the name of the organ in the body that makes insulin.
			[1]
	(b)	Jim	is a 14 year old boy who has Type 1 diabetes.
		Jim	needs medical treatment for his Type 1 diabetes.
		He	injects insulin into his body.
		Des	scribe how insulin travels around the body.
			[1]
	(c)	The	more carbohydrate Jim eats, the more insulin he needs.
		Ехр	lain why.
			[2]
	(d)	Jim	thinks he inherited Type 1 diabetes from his father.
		(i)	Inherited characteristics are controlled by genes.
			Write down the part of the cell that contains genes.
			[1]
		(ii)	Characteristics can be controlled by genes and by the environment.
			Put a ring around one characteristic controlled by <b>both</b> genes and the environment.
			colour blindness
			cystic fibrosis
			eye colour
			intelligence
			[1]
			[Total: 6]

Polio is an illness caused by a virus.
 In 1988 a campaign started to rid the world of polio.
 The campaign wanted to vaccinate children all over the world.

Look at the table below.

It shows the number of reported polio cases for different areas of the world in 1996 and 2011.

Area of	Number of polio cases		
the world	1996	2011	
Africa	1949	397	
America	0	0	
Eastern Mediterranean region	532	297	
Europe	193	0	
South East Asia	1203	1	
Western Pacific region	197	21	

(a) Describe the patterns in the data and suggest reasons for these patterns.

The quality of written communication will be assessed in your answer to this question.

The quality of written communication will be assessed in your answer to this question.

[6]

(b) When polio viruses enter the body white blood cells try to destroy them.

Write down two ways white blood cells can destroy viruses.

[Total: 8]

Turn over

Benny is cooking his tea.



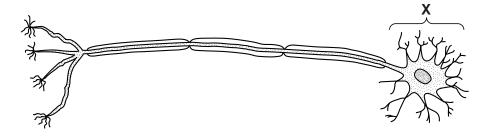
He lifts a hot plate of food.

The plate is very hot.

Benny holds onto the plate until he can slowly put it down.

(a)	Benny's response to the hot plate is <b>not</b> a reflex action.
	Explain why his response is not a reflex action.
	[2]
(b)	The hot plate is a stimulus.
	How does the brain receive information about this stimulus?
	[2]
(c)	Motor neurones are part of Benny's nervous system.

Look at the diagram below of a motor neurone.



Write down the name of part X.

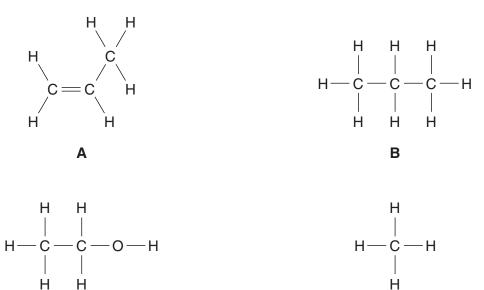
.....[1]

[Total: 5]

# 9 **SECTION B - Module C1**

5 This question is about carbon compounds.

Look at the displayed formulas below.



(a) Which displayed formula contains a total of 11 atoms?

Choose from A, B, C or D.

[1] answer .....

D

(b) Which compound is **not** a hydrocarbon?

Explain your answer.

.....[2]

(c) Molecules of compound A can join together to make a polymer called poly(propene).

What is the **name** of compound **A**?

.....[1]

(d) What is the molecular formula of compound C?

.....[1]

[Total: 5]

Thi	This question is about crude oil.								
(a)	Cru	de oil is separated into useful products called fractions.							
	(i)	(i) What is the name of the process that is used to separate crude oil?							
		[	1]						
	(ii)	Diesel is one fraction separated from crude oil.							
		Write down the names of <b>two other</b> fractions that are separated from crude oil.							
			2]						
(b)		bon monoxide gas is formed by the incomplete combustion of diesel in car engines.							
	(i)	Write down one problem caused by carbon monoxide.							
		[	1]						
	(ii)	What part of a car removes carbon monoxide from the exhaust gases?							
		Choose from the list.							
		antioxidant							
		catalytic converter							
		catalytic cracker							
		engine							
		[	1]						
(c)	Cru	de oil is often transported in large ships called oil tankers.							
	The	ese oil tankers sometimes spill crude oil.							
	Cru	de oil spills cause environmental problems.							
	Wri	te about <b>two</b> of these problems.							
		[2	2]						

7	This question is about fuels.					
	(a)	Butane burns in oxygen.				
		Carbon dioxide and water are made.				
		Write a word equation for this combustion reaction.				
		[1]				
	(b)	Combustion of butane releases energy.				
		What type of useful energy is released?				
		Choose from the list.				
		chemical				
		electrical				
		heat				
		kinetic				
		answer				

# (c) Look at the information below about some fuels.

Fuel	State at room temperature	Availability	Energy released in kJ/g	Is carbon dioxide released?	Cost of 1 kg in £
coal	solid	good	33	yes	0.3
ethanol	liquid	limited	30	yes	0.8
hydrogen	gas	limited	122	no	5.0
methane	gas	good	56	yes	1.3

A factory owner decides to use methane as a fuel to heat a new factory.

Using the information in the table, write about the **advantages** and **disadvantages** of her choice.

Write down **two other** factors, not in the table, that she would need to consider when choosing which fuel to use.

The quality of written communication will be assessed in your answer to this question	
 [0	ĵ]

[Total: 8]

8 This question is about chemical changes.

Four substances, A, B, C and D are added to four different test tubes of acid.

Look at the table. It shows the results of the experiments.

Substance Observations		Temperature at start in °C	Temperature at end in °C
Α	stays a white solid	19	19
В	colourless gas given off	23	18
С	solution stays colourless	19	24
D	stays a grey solid	18	18



	powo						

Baking powder contains a chemical with the formula NaHCO<sub>3</sub>.

Write down the **names** of the **elements** in NaHCO<sub>3</sub>.

[2]

[Total: 5]

**Turn over** 

© OCR 2016

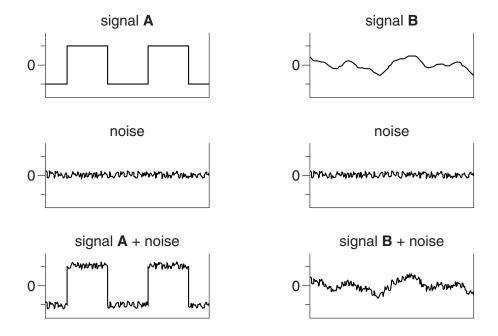
[Total: 4]

# 14 SECTION C - Module P1

9	Thi	s question is about waves.	
	(a)	Look at the list.	
		It shows waves from the electromagnetic spectrum.	
		infrared	
		microwave	
		radio	
		ultraviolet	
		visible	
		Complete the sentences using words from the list.	
		(i) Sending text messages on mobile phones uses sig	nals. <b>[1</b> ]
		(ii) TV remote controls use radiation.	[1]
		(iii) The wave with the highest frequency is	[1]
	(b)	All electromagnetic waves travel in a vacuum.	
		Put a tick ( $\checkmark$ ) in the box next to the correct statement about electromagnetic waves vacuum.	s in a
		Waves with a high frequency travel faster than waves with a low frequency.	
		Waves with a long wavelength travel faster than waves with a short wavelength.	
		Waves all travel at the same speed in a vacuum.	
		Waves in a vacuum have the same speed as waves in glass and air.	
			[1]

**10** This question is about two different signals.

Look at the information showing what happens to these signals when noise is added to them.



Name the types of signals shown by  ${\bf A}$  and  ${\bf B}$  and describe how they change when noise is added to them.

Explain why it is easier to remove noise from signal A.

The quality of written communication will be assessed in your answer to this question.
 [6]

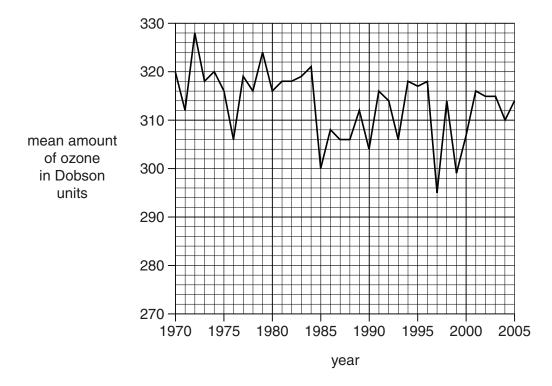
Turn over

[Total: 6]

11 The condition of the ozone layer near the South Pole concerns scientists.

Scientists have been measuring the mean amount of ozone in the upper atmosphere.

Look at their results below from 1970 to 2005.



(a) Scientists predicted that the amount of ozone in 1997 was the lowest they were likely to record.

(i)	Is this prediction correct?
	Explain your answer.
	[1]
(ii)	What should the scientists do to check their prediction?
	[1]

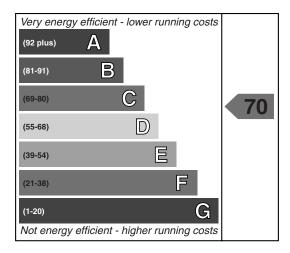
(b)	The	e ozone layer protects the Earth from ultraviolet radiation (UV).	
	(i)	Use the graph to find out the year that the ozone layer gave the most protecultraviolet radiation.	ction from
		Most protection from UV was in the year	[1]
	(ii)	Too much exposure to UV can cause sunburn.	
		Write down <b>two</b> other health problems caused by too much exposure to UV.	
			[2]
			[Total: 5]

Question 12 begins on page 18

© OCR 2016 Turn over

**12** Lyndsay and Kevin buy a new house.

The house has an energy performance certificate.



(a)	The energy	efficiency	of their	house	is	70.
-----	------------	------------	----------	-------	----	-----

The efficiency is calculated when the heating is on for 9 hours a day.

All house efficiency measurements are made using this time.

7 th House emoleticy measurements are made doing this time.
Suggest why.
[1]
Lyndsay and Kevin want to check the energy efficiency of their house.
Write down <b>two</b> measurements they use to calculate the energy efficiency of their house.

(b)

[Total: 7]

(c) Here are three different ways to increase the energy efficiency of Lyndsay and Kevin's house.

How to increase energy efficiency	Cost to install in £	Saving on energy bills each year in £
Cavity wall insulation	1400	400
Low energy light bulbs for whole house	20	10
Thermostat for heating	35	100

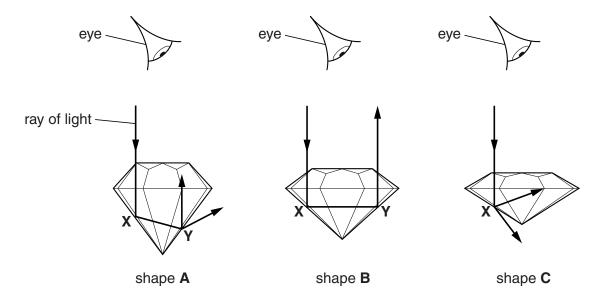
(i)	One of the ways to increase efficiency is to add cavity wall insulation.
	Lyndsay thinks this is a good idea because they will be living in the house for at least 5 years.
	Use the information in the table to show that Lyndsay is correct.
	[2]
(ii)	Kevin thinks the cost of cavity wall insulation is expensive.
	He wants to spend £55 on low energy light bulbs and a thermostat.
	Which will save more money after 5 years
	cavity wall insulation
	low energy light bulbs and a thermostat?
	answer
	Explain your answer.

© OCR 2016 Turn over

13 Gemstones are cut into shapes to make them reflect as much light as possible.

The more light they reflect, the more they sparkle.

Look at the diagrams below of three different shaped gemstones.



Describe what happens to the ray of light in each diagram **and** use this to explain which gemstone sparkles the most when looked at from above.

The description for shape **A** has been done for you.

In shape <b>A</b> the ray of light passes through the gemstone and is reflected at <b>X</b> and then at <b>Y</b> it is reflected and refracted.	S
	[3]
[Total	31

# **END OF QUESTION PAPER**

# 21 ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margins.		

 L

	•••••
	•••••
 I	



## 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.

# The Periodic Table of the Elements

0	4 He	20 <b>Ne</b> neon 10	40 <b>Ar</b> argon 18	84 <b>Kr</b> krypton 36	131 <b>Xe</b> xenon 54	[222] <b>Rn</b> radon 86	t fully
7		19 F fluorine 9	35.5 C <b>1</b> chlorine 17	80 Br bromine 35	127 <b>I</b> iodine 53	[210] <b>At</b> astatine 85	orted but no
9		16 0 oxygen 8	32 S sulfur 16	79 Se selenium 34	128 Te tellurium 52	[209] Po polonium 84	ve been repo
2		14 N nitrogen 7	31 P phosphorus 15	75 As arsenic 33	122 Sb antimony 51	209 Bi bismuth 83	s 112-116 hav authenticated
4		12 C carbon 6	28 Si silicon 14	73 Ge germanium 32	119 Sn tin 50	207 <b>Pb</b> lead 82	mic numbers a
33		11 <b>B</b> boron 5	27 A1 aluminium	70 <b>Ga</b> gallium 31	115 In indium 49	204 T t thallium 81	Elements with atomic numbers 112-116 have been reported but not fully authenticated
	·			65 <b>Zn</b> zinc 30	112 Cd cadmium 48	201 Hg mercury 80	Elemei
				63.5 Cu copper 29	108 Ag silver 47	197 <b>Au</b> gold 79	Rg roentgenium
				59 Ni nickel 28	106 Pd palladium 46	195 Pt platinum 78	[271] Ds damstadtlum 110
				59 Co cobalt 27	103 Rh rhodium 45	192 <b>Ir</b> iridium 77	[268] Mt meitnerium 109
	1 H hydrogen 1			56 Fe iron 26	101 Ru ruthenium 44	190 Os osmium 76	[277] Hs hassium 108
_				55 Mn manganese 25	[98] Tc technetium 43	186 Re rhenium 75	[264] Bh bohrium 107
		mass ool number		52 Cr chromium 24	96 Mo molybdenum 42	184 W tungsten 74	Sg seaborgium 106
	Key	relative atomic mass atomic symbol name atomic (proton) number		51 V vanadium 23	93 Nb niobium 41	181 Ta tantalum 73	[262] Db dubnium 105
		relati atc atomic		48 Ti titanium 22	91 Zr zirconium 40	178 Hf hafnium 72	Rf rutherfordium 104
	·			45 Sc scandium 21	89 Y yttrium 39	139 La* lanthanum 57	[227] Ac* actinium 89
2		9 Be beryllium 4	24 Mg magnesium 12	40 Ca	Sr Strontium 38	137 <b>Ba</b> barium 56	[226] Ra radium 88
<b>—</b>		7 Li lithium 3	23 Na sodium 11	39 K potassium 19	85 <b>Rb</b> rubidium 37	133 Cs caesium 55	[223] Fr francium 87

\* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.