

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B623/01

ADDITIONAL SCIENCE B

Unit 1 Modules B3 C3 P3 (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)

Wednesday 26 May 2010
Morning

Duration: 1 hour



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- 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).

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 two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

2

EQUATIONS

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

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

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

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

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

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

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Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

Section A – Module B3

1 Paul grows a geranium plant on his window sill.



(a) (i) Paul notices that the plant grows towards the window.

Suggest **one** reason why the plant grows towards the window.

.....
..... [1]

(ii) The roots grow down into the soil.

Suggest **one** reason why the roots grow down into the soil.

.....
..... [1]

(b) Paul takes a cutting from his geranium plant and grows a new plant from it.

Describe how Paul should do this.

Your answer should include

- how to take a cutting
- how to grow the new plant.

.....

.....

.....

..... [3]

(c) Paul's original geranium plant has white flowers.

He expects his new geranium plant to have white flowers as well.

Explain why.

.....

..... [1]

(d) Most of the flowers are white on Paul's new geranium plant.

However, one flower is pink.

This has been caused by a **mutation**.

What is a mutation?

.....

..... [1]

[Total: 7]

2 Liz has a pig farm.

She grows the pigs for their meat.



(a) Liz wants to use selective breeding to improve her herd of pigs.

She chooses a male pig to breed with her female pigs.

She chooses a male pig that produces lots of meat.

Which **other** features would be **best** to choose?

Put ticks (✓) in **two** boxes to show your answers.

dark skin colour

fast growth rate

hairy skin

resistance to many diseases

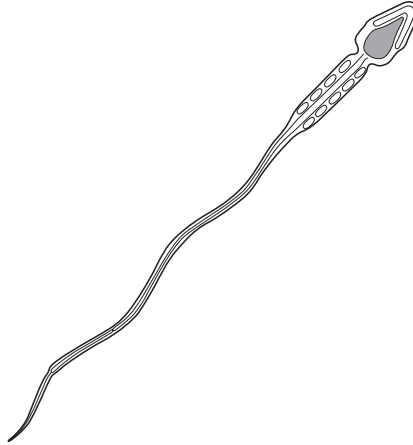
long ears

[2]

(b) Liz collects sperm cells from the male pig.

She puts the sperm cells into her female pigs.

Look at the diagram of a sperm cell.



Write down **two** ways that sperm cells are different from **egg** cells.

- 1
-
- 2
- [2]

(c) Sperm cells swim to the egg cells and join with them.

The eggs then start to grow into baby pigs.

Look at the following statements about this process.

1	Sperm cells swim to the egg cells.
2	Sperm cells join with the egg cells.
3	Each egg cell grows into a ball of identical cells.
4	The identical cells start to develop into different types of cells.
5	The baby pig is born.

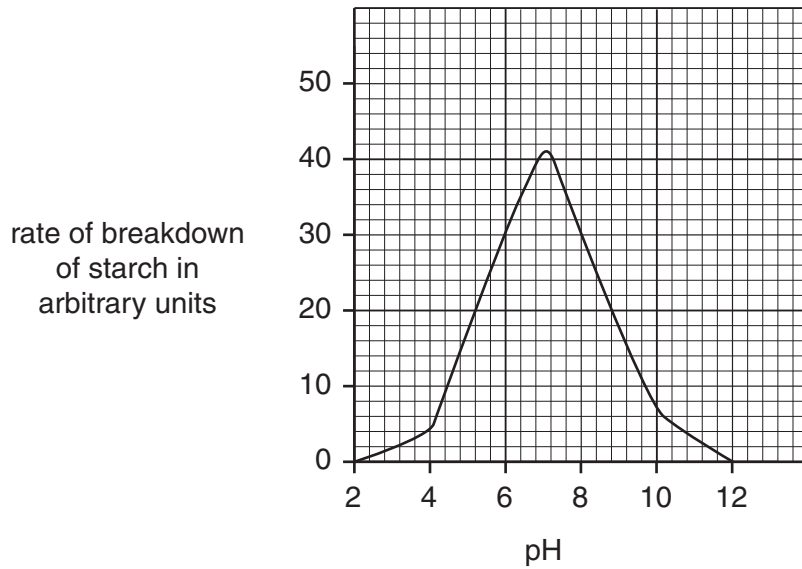
- (i) Which statement describes **cell differentiation**? Choose 1, 2, 3, 4 or 5. [1]
- (ii) Which statement describes **cell division**? Choose 1, 2, 3, 4 or 5. [1]
- (iii) Which statement describes **fertilisation**? Choose 1, 2, 3, 4 or 5. [1]

[Total: 7]

3 In the digestive system, the carbohydrate starch is broken down into sugar.

This begins in the mouth and uses the enzyme amylase.

(a) The graph shows how the rate of breakdown of starch by amylase changes as the pH increases.



Look at the graph.

(i) Describe how the rate of breakdown of starch changes as the pH increases.

.....

.....

..... [2]

(ii) Write down the optimum pH of amylase.

..... [1]

(b) Sugar is absorbed from the small intestine into the blood.

(i) Write down the name of this absorption process.

.....

What causes sugar to be absorbed by this process?

.....

..... [2]

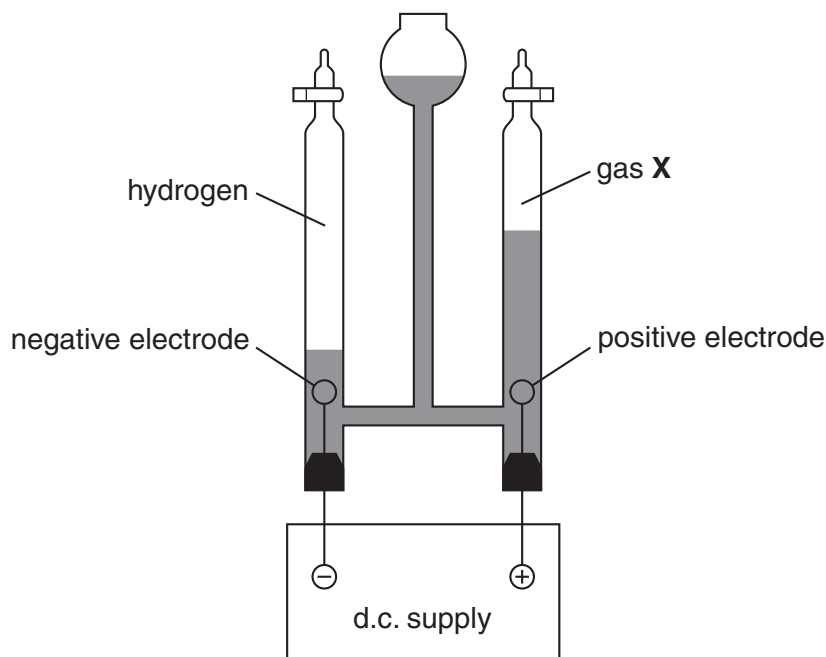
(ii) Which part of the blood transports sugar?

..... [1]

[Total: 6]

Section B – Module C3

- 4 Look at the diagram. It shows the apparatus used to electrolyse dilute sulfuric acid.



- (a) Hydrogen gas is made at the negative electrode.

What is the test for hydrogen gas?

.....

 [2]

- (b) What is the **name** of the **negative** electrode?

..... [1]

- (c) Gas **X** is made at the positive electrode.

Write down the name of gas **X**.

..... [1]

- (d) Look at the list of particles in dilute sulfuric acid.



Write down the formula of a **cation**.

Choose from the list.

answer [1]

[Total: 5]

5 Alice and Jamie investigate some reactions of the Group 7 elements.

Chlorine and bromine are Group 7 elements.

(a) Write down the name of one **other** Group 7 element.

..... [1]

(b) Look at the table.

It shows what is made when Group 7 elements react with Group 1 elements.

Complete the table.

	name of compound made in reaction with	
	chlorine	bromine
sodium	sodium chloride
potassium	potassium bromide

[2]

(c) Write a **word** equation for the reaction of sodium with chlorine.

..... [1]

(d) Write down one use of **chlorine**.

Choose from the list.

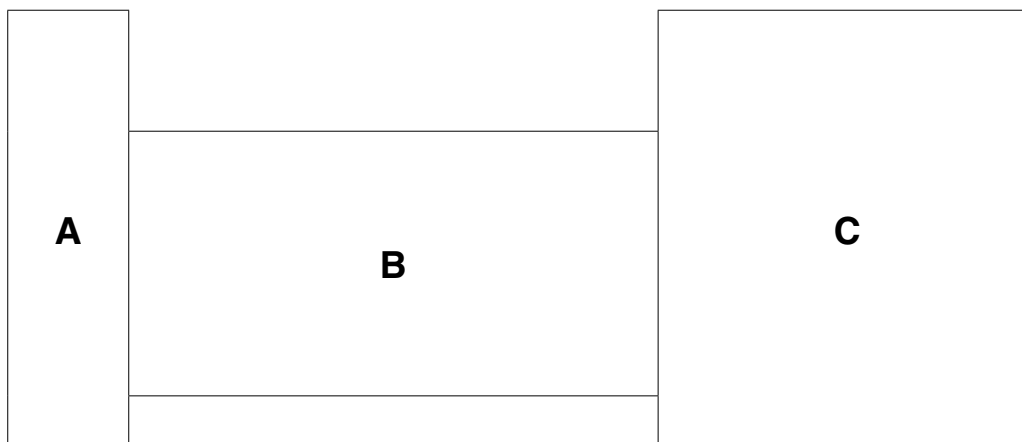
- as a flavouring
- as a preservative
- making pesticides
- sterilising wounds

answer [1]

[Total: 5]

6 This question is about transition elements.

Look at the outline of the Periodic Table.



(a) Which letter shows the transition elements in the Periodic Table?

Choose **A**, **B** or **C**.

answer

[1]

(b) The compounds of transition elements are often coloured.

Draw a straight line to match each **compound** to its **colour**.

compound

colour

iron(III) sulfate

orange / brown

copper sulfate

pale green

iron(II) sulfate

blue

[2]

(c) Transition elements are metals.

One property of metals is that they are shiny.

Write about **other** properties of metals.

.....

.....

..... [2]

[Total: 5]

7 This question is about some chemicals.

(a) The formula of copper carbonate is



(i) How many different **elements** are there in copper carbonate?

..... [1]

(ii) What is the **total number** of atoms in the formula CuCO_3 ?

..... [1]

(iii) Find copper, Cu, on the Periodic Table.

What is the **atomic number** of copper?

..... [1]

(b) Look at the table.

It gives some information about the properties of sodium chloride.

Complete the table.

electrical conductivity	solubility in water	melting point
does not conduct when solid	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>

[2]

[Total: 5]

15
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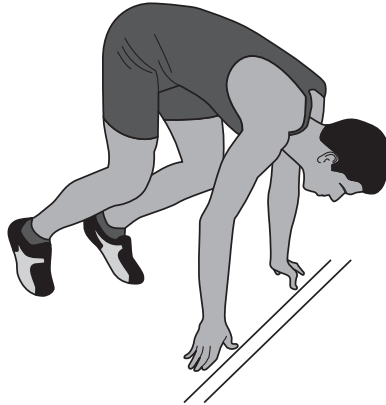
Question 8 begins on page 16.

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Section C – Module P3

8 Ibrahim is the fastest runner in his class.

He runs a 100 metre race.



(a) Other pupils in his class calculate his speed during the race.

They measure the **distance** he runs and the **time** he takes for the race.

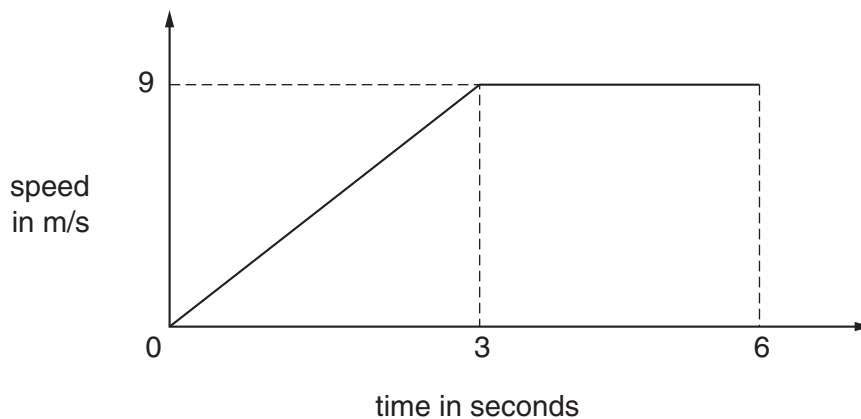
What **instruments** do the pupils use to measure distance and time?

Complete the sentences.

They measure distance using a

They measure time using a [2]

(b) Look at the graph of part of Ibrahim’s race.



(i) What happens to Ibrahim’s speed **during** the first 3 seconds of the race?

..... [1]

(ii) What happens to Ibrahim’s speed **between** 3 and 6 seconds?

..... [1]

(iii) Ibrahim's speed is 9 metres per second (m/s) after 3 seconds.

Calculate his acceleration during the first 3 seconds.

The equations on page 2 may help you.

.....
.....
.....

answer m/s²

[2]

[Total: 6]

9 Julie drives her car.



Julie approaches some traffic lights.

The lights change to red (stop). She stops the car quickly.

Look at the three statements about different distances when stopping a car.

statement A	distance travelled from Julie realising she needs to brake to putting the brakes on
--------------------	---

statement B	distance travelled from Julie putting the brakes on until the car stops
--------------------	---

statement C	distance travelled before Julie decides she has to brake
--------------------	--

(a) (i) Which statement best describes **thinking** distance?

Choose from

statement A statement B statement C

answer

[1]

(ii) Which statement describes **braking** distance?

Choose from

statement A statement B statement C

answer

[1]

(b) (i) Work is done when Julie applies the brakes.

While the brakes are applied

- the car travels 15 m
- the braking force is 4000 N.

Calculate the work done by the brakes.

The equations on page 2 may help you.

.....
.....
.....

answer joules [2]

(ii) Power measures how quickly work is done.

Write down the name of the **unit** of power.

Choose from:

- kilogram** **newton** **volt** **watt**

answer [1]

(c) The traffic lights turn green. Julie pulls away from the lights.

She now drives the car at a higher speed.

Higher speed increases her braking distance. It also increases her thinking distance.

Write about **other** factors that could **increase**

- the braking distance
- the thinking distance.

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

- (d) (i) Julie's car uses a fuel made from a fossil fuel.

Write down the name of **one** fuel made from a fossil fuel that the car could use.

..... [1]

- (ii) Julie's friend Susan has a different type of car. It runs on electrical energy.

How does Susan's car get its energy?

..... [1]

[Total: 9]

10 Many safety features of modern cars work by absorbing energy when vehicles stop suddenly.

One example of this is car brakes.

Write down two **other** safety features in a car that absorb energy when a car stops suddenly.

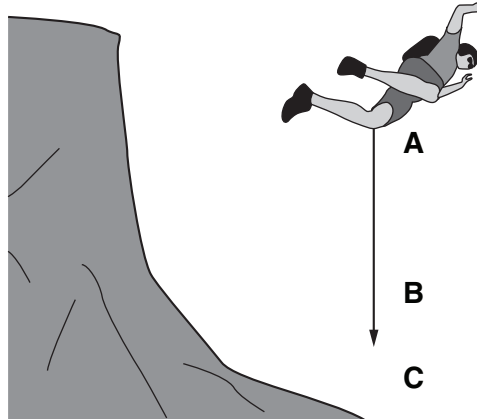
1

2 [2]

[Total: 2]

11 Kevin is a parachutist.

Look at the drawing. It shows Kevin jumping from a high mountain.



Kevin falls. He does not open his parachute yet.

(a) (i) Where will Kevin's **potential** energy be the greatest?

Choose from:

A

B

C

answer

[1]

(ii) Where will Kevin's **speed** be the greatest?

Choose from:

A

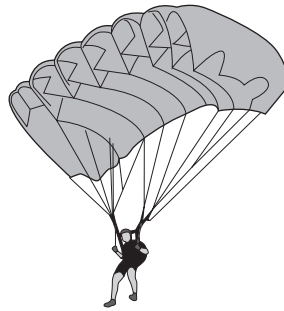
B

C

answer

[1]

(b) Kevin opens his parachute. He slows down.



What is the name of the **force** slowing Kevin down?

..... [1]

[Total: 3]

END OF QUESTION PAPER

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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0
	1 H hydrogen 1							4 He helium 2
		9 Be beryllium 4		12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
	23 Na sodium 11	24 Mg magnesium 12		28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
	39 K potassium 19	40 Ca calcium 20		70 Ga gallium 31	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
	85 Rb rubidium 37	88 Sr strontium 38		115 In indium 49	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
	133 Cs caesium 55	137 Ba barium 56		204 Tl thallium 81	209 Pb lead 82	207 Po polonium 84	[210] At astatine 85	[222] Rn radon 86
	[223] Fr francium 87	[226] Ra radium 88		Elements with atomic numbers 112-116 have been reported but not fully authenticated				
				65 Zn zinc 30	63.5 Cu copper 29	108 Ag silver 47	112 Cd cadmium 48	
				59 Ni nickel 28	59 Co cobalt 27	106 Pd palladium 46	197 Hg mercury 80	
				56 Fe iron 26	59 Co cobalt 27	103 Rh rhodium 45	192 Ir iridium 77	
				55 Mn manganese 25	[98] Tc technetium 43	190 Ru ruthenium 44	197 Au gold 79	
				52 Cr chromium 24	96 Mo molybdenum 42	190 Os osmium 76	[272] Rg roentgenium 111	
				51 V vanadium 23	93 Nb niobium 41	192 Pt platinum 78	[271] Ds darmstadtium 110	
				48 Ti titanium 22	91 Zr zirconium 40	192 Ir iridium 77	[268] Mt meitnerium 109	
				45 Sc scandium 21	89 Y yttrium 39	186 Re rhenium 75	[277] Hs hassium 108	
				44 Ti titanium 22	91 Zr zirconium 40	184 W tungsten 74	[264] Bh bohrium 107	
				43 Sc scandium 21	89 Y yttrium 39	178 Hf hafnium 72	[266] Sg seaborgium 106	
				42 Ti titanium 22	91 Zr zirconium 40	173 Ta tantalum 73	[262] Db dubnium 105	
				41 Sc scandium 21	89 Y yttrium 39	178 Hf hafnium 72	[261] Rf rutherfordium 104	
				40 Ca calcium 20	88 Sr strontium 38	139 La* lanthanum 57	[227] Ac* actinium 89	
				39 K potassium 19	40 Ca calcium 20	137 Ba barium 56	[226] Ra radium 88	
				38 K potassium 19	40 Ca calcium 20	139 La* lanthanum 57	[227] Ac* actinium 89	

Key
relative atomic mass
atomic symbol
name
atomic (proton) number

* 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.