

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL SCIENCE A**

A215/01

Unit 1 Modules B4 C4 P4 (Foundation Tier)

TUESDAY 17 JUNE 2008

Morning
Time: 40 minutes

Candidates answer on the question paper.

Additional materials (enclosed):
None

Calculators may be used.

Additional materials: Pencil
Ruler (cm/mm)



* G U P / T 4 6 0 9 0 *

Candidate Forename

Candidate Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **42**.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	4	
2	5	
3	1	
4	4	
5	4	
6	5	
7	5	
8	5	
9	4	
10	2	
11	3	
TOTAL	42	

This document consists of **19** printed pages and **1** blank page.

TWENTY FIRST CENTURY SCIENCE EQUATIONS

Useful Relationships

Explaining Motion

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

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

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

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

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

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

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

Electric Circuits

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

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

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

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

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

The Wave Model of Radiation

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

Answer **all** the questions.

- 1 (a) Some bottles of chemicals have hazard symbols on them.

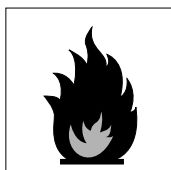
Draw a straight line from each **hazard symbol** to its **meaning**.

hazard symbol

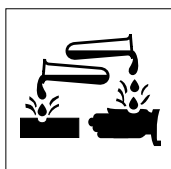


meaning

corrosive



toxic



highly
flammable

[2]

- (b) We often need to know whether a chemical is a solid, liquid or gas at room temperature.

Fill in the boxes to show if these chemicals are **solid**, **liquid** or **gas** at room temperature.

chemical	melting point in °C	boiling point in °C	solid, liquid or gas
A	114	184	
B	42	713	
C	-7	58	

[2]

[Total: 4]

2 The Periodic Table lists all the chemical elements.

(a) The elements are all arranged in order. What is this order?

- A alphabetical order
- B order of mass
- C order of proton number
- D order of boiling point
- E order of reactivity
- F order of size

answer [1]

(b) Use the Periodic Table at the back of this paper to find the element with atomic number = 3.

Write down its name, symbol and relative atomic mass.

name

symbol

relative atomic mass [3]

(c) The electron arrangement of one element in the Periodic Table is 2.8.7.

Put a **ring** around the group number for this element.

2 3 7 8

[1]

[Total: 5]

3 In 1859 Robert Bunsen discovered line spectra.

Mary asks her friends why line spectra are useful.



Ann
To help
design the Bunsen
burner

Boyle
To help
discover new
elements



Charles
To help
explain the Periodic
Table



Sam
To make
narrow beams
of light



Who gives the **best** answer?

answer [1]

[Total: 1]

4 A doctor tells Johnny that he should use 'low-salt' instead of normal salt.

(a) In 'low-salt', some of the sodium chloride is replaced with potassium chloride.

Why is it possible to replace sodium chloride with potassium chloride in salt?

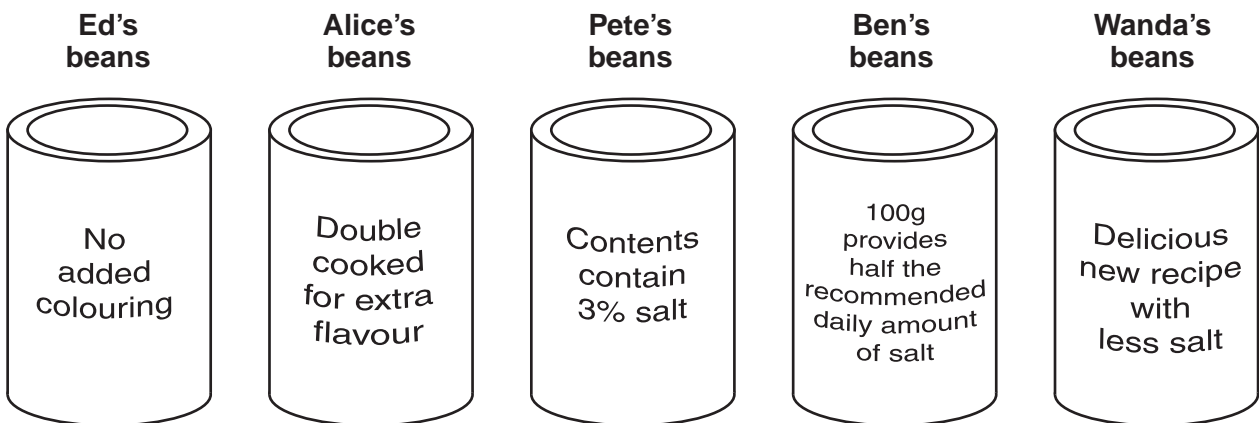
Choose the statement which is the most likely explanation.

- A Sodium is more reactive than potassium.
- B When salt dissolves, its ions split apart.
- C Potassium chloride flows more easily than sodium chloride.
- D Sodium and potassium are both in Group I.

answer [1]

(b) Johnny checks the amount of **salt** in different tins of baked beans.

The labels have different amounts of useful information.



Fill in the boxes below to show the order of **increasing** useful information in the labels.

The first one has been done for you.

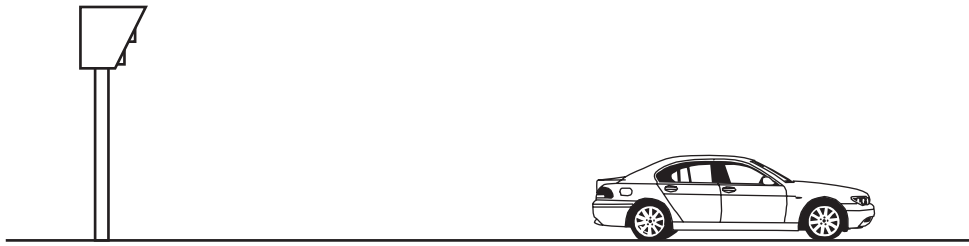
order \longrightarrow

Alice				
-------	--	--	--	--

[3]

[Total: 4]

5 Jake drives his car past a speed camera.



(a) The camera takes a photograph of the car.

It takes another photograph 0.50 s later.

The photographs show that the car moves a distance of 9.0 m between the two photographs.

What is the average speed of the car?

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

0.056 m/s

4.5 m/s

18 m/s

450 m/s

[1]

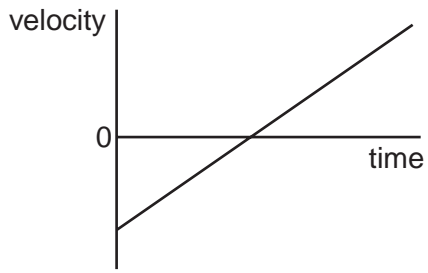
(b) The car is speeding up as the photographs are being taken.

(i) Complete the table with **true** or **false** for a car which is speeding up.

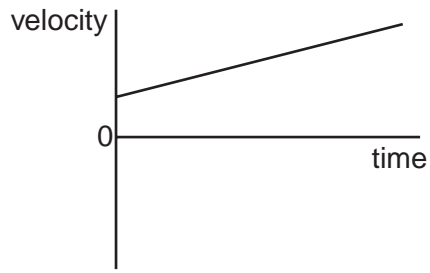
The counter force on the car is ...	true or false
... equal to the driving force.	
... less than the driving force.	
... getting smaller all the time.	
... greater than the driving force.	
... in the same direction as the driving force.	
... in the opposite direction to the driving force.	

[2]

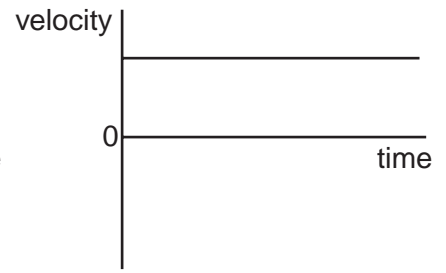
(ii) Which of these velocity-time graphs, **A**, **B**, **C** or **D**, shows the motion of the car as it passes the speed camera?



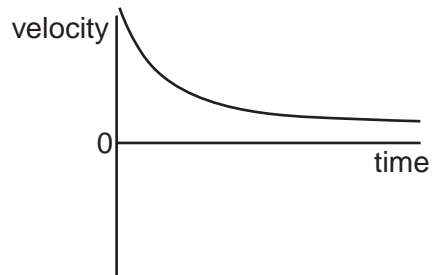
A



B



C

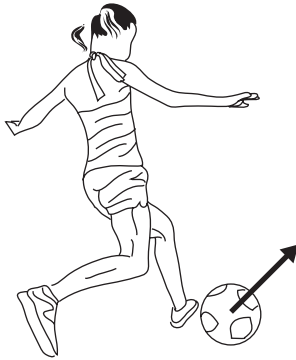


D

answer [1]

[Total: 4]

6 Sally plays football.



(a) When she kicks the ball, she exerts a force on it.

The direction of the force is shown in the diagram above.

One of the diagrams below shows the direction of the force on Sally's foot **from the ball**.

Draw a **ring** around the correct diagram.



[1]

(b) Sally exerts a force of 100 N on the ball for 0.25 s.

How should she calculate the change of momentum of the ball?

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

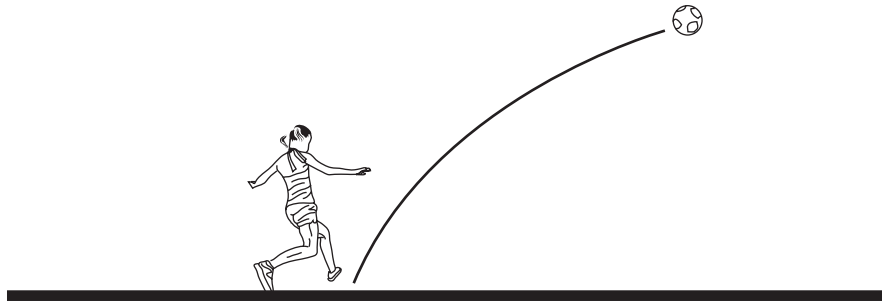
$$\frac{100}{0.25}$$

$$100 \times 0.25$$

$$\frac{0.25}{100}$$

[1]

(c) The diagram shows the path followed by the ball once it has left Sally's foot.



Complete the sentences. Choose words from this list.

mass

motion

weight

kinetic

momentum

gravitational

- (i) As the ball rises into the air it gains potential energy. [1]
- (ii) This is because of the work the ball does against its [1]
- (iii) At the same time, the ball loses energy. [1]

[Total: 5]

7 Byron goes for a walk in the park.



(a) The ground under Byron's feet exerts two forces on him.

Complete the table. Choose words from this list.

You may **not** use the same word twice.

friction mass reaction weight

direction of force from the ground	name of force
vertical	
horizontal	

[2]

(b) Byron moves forwards at a steady speed.

Complete the sentences. Choose words from this list.

You may **not** use the same word twice.

weight friction upwards forwards backwards

To move forwards, Byron's foot has to exert a force on the ground.

The foot does not slip because of

The friction exerts a force on Byron's foot.

[3]

[Total: 5]

8 Dan is carrying out vigorous exercise.

He is using equipment in a gym.



(a) What happens to Dan's core body temperature to cause him to sweat?

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

decreases

increases

stays the same

[1]

(b) Sweating is one aspect of homeostasis.

What is homeostasis?

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

the decrease in activity within the internal environment

the increase in activity within the internal environment

the maintenance of a constant internal environment

the maintenance of a constant external environment

[1]

(c) Any changes in Dan's core body temperature are detected and processed.

Different parts of the body are involved.

Complete the sentences. Choose the **best** words from this list.

Each word may be used once, more than once or not at all.

blood brain heart liver skin

Changes in the external temperature are detected by temperature receptors
in the

Changes in the temperature of the blood are detected by temperature receptors
in the

Information received from the temperature receptors is processed
by the [2]

(d) Dan loses water as he sweats.

How else can Dan lose water?

Put a **ring** around each of the **two** correct answers.

breathing digesting eating excreting respiring [1]

[Total: 5]

- 9 Bacteria are able to break down and digest food.

The bacteria secrete enzymes onto the food to speed up the process.

- (a) What are enzymes made of?

Put a tick (✓) in the correct box.

carbohydrates

fats

proteins

[1]

- (b) Fresh food is often stored in a refrigerator at 4 °C to keep it fresh for longer.

Why does this work?

Put a tick (✓) in the correct box.

Bacteria die at 4 °C.

Enzymes work much more slowly at 4 °C.

Bacteria reproduce more rapidly at 4 °C.

[1]

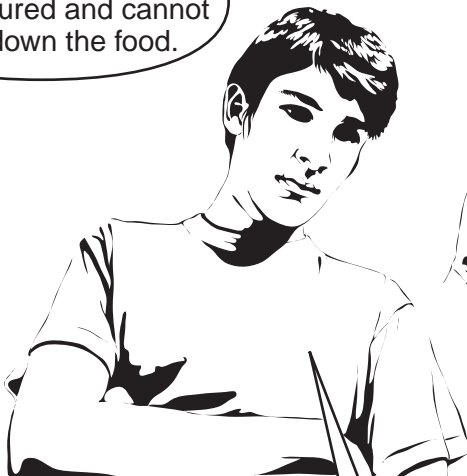
(c) Food cooked at high temperatures can last longer than fresh food.

Five people were asked to give a reason for this.



Jane
Bacterial enzymes are denatured and cannot break down the food.

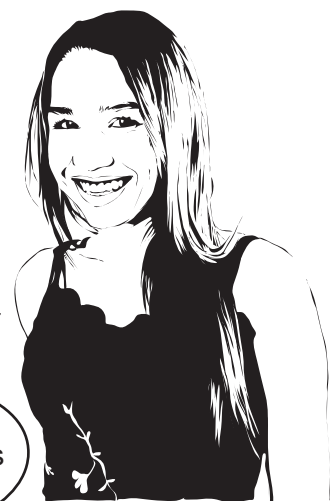
Mike
The shape of the bacterial enzymes is changed so that they no longer fit the food molecules.



Ed
The collision rate between the bacterial enzymes and the food molecules is reduced.



Ricky
Enzymes need a high temperature to work at their best.



Sarah
The rate of reaction between the bacterial enzymes and the food molecules is increased.

Which two people gave the **best** answers?

..... and [2]

[Total: 4]

10 Liz uses an experiment to show the effect of different solutions on potato tissue.

She cuts up pieces of potato, measures their length, and puts them in different beakers.

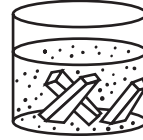
After an hour, Liz measures the length of the potato pieces again.



A
dilute
sugar
solution



B
pure
water



C
highly
concentrated
sugar
solution

(a) What will happen to the length of the potato pieces in beaker **B**?

Put a (ring) around the correct answer.

length decreases

length increases

length stays the same

[1]

(b) Which process is Liz studying in her experiment?

Put a (ring) around the correct answer.

digestion

osmosis

respiration

[1]

[Total: 2]

11 Kidneys keep the correct balance of water and salt in the body.

They also carry out the process of excretion.

(a) Which of the following is **not** reabsorbed into the blood in the kidneys?

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

salt sugar urea water

[1]

(b) The amount of water removed by the kidneys is affected by a number of factors.

The kidneys can produce more dilute or more concentrated urine as a result.

Put a tick (✓) in the correct box for each factor.

factors	more dilute urine	more concentrated urine
An increased level of physical exercise is taking place.		
There is a high external temperature.		
Too much fluid is taken in to the body.		
Too much salt is taken in to the body.		

[2]

[Total: 3]

END OF QUESTION PAPER

18
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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0										
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminium 13	14 Si silicon 14	15 P phosphorus 15	16 S sulfur 16	17 Cl chlorine 17	18 Ar argon 18								
	19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29	30 Zn zinc 30	31 Ga gallium 31	32 Ge germanium 32	33 As arsenic 33	34 Se selenium 34	35 Br bromine 35	36 Kr krypton 36
	37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium 43	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Ag silver 47	48 Cd cadmium 48	49 In indium 49	50 Sn tin 50	51 Sb antimony 51	52 Te tellurium 52	53 I iodine 53	54 Xe xenon 54
	55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 At astatine 85	86 Rn radon 86
[223]	Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1	H	hydrogen	1
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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.