OCR
RECOGNISING ACHIEVEMENT

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A215/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL SCIENCE A
Unit 1 Modules B4 C4 P4 (Foundation Tier)
SAMPLE ASSESSMEMT MATERIAL
(from 2010 onwards)

Time: 40 minutes

Candidates answer on the question paper
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)

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 black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- 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	**2**	
2	**4**	
3	**5**	
4	**3**	
5	**4**	
6	**6**	
7	**4**	
8	**4**	
9	**5**	
10	**5**	
TOTAL	**42**	

This document consists of **16** printed pages.

TWENTY FIRST CENTURY SCIENCE EQUATIONS

Useful Relationships

Explaining Motion

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

momentum = mass x velocity

change of momentum = resultant force x time for which it acts

work done by a force = force x distance moved by the force

change in energy = work done

change in GPE = weight x vertical height difference

kinetic energy = ½ x mass x [velocity]^2

Electric Circuits

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

$$\frac{\text{Voltage across primary coil}}{\text{Voltage across secondary coil}} = \frac{\text{Number of turns in primary coil}}{\text{Number of turns in secondary coil}}$$

energy transferred = power x time

power = potential difference x current

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

The Wave Model of Radiation

wave speed = frequency x wavelength

Answer **all** questions.

1 Bobby watches a stage magician.

The magician throws a handful of powder into a flame. The flame turns green.

Bobby realises that the powder contains copper.

How does Bobby know the powder contains copper?

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

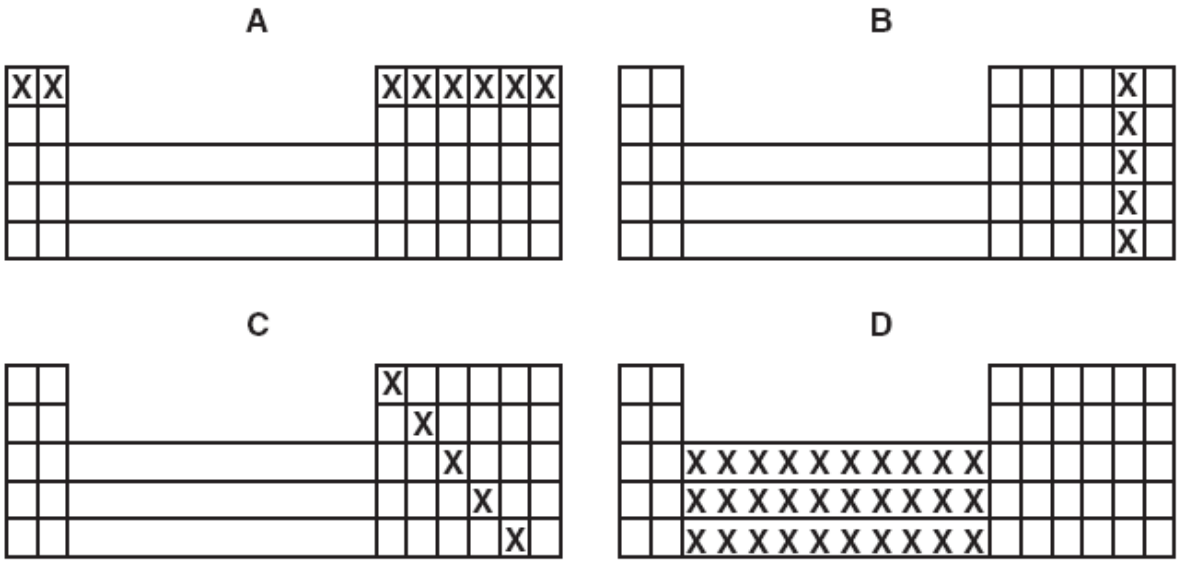
It is a magic trick.	☐
Many elements change the colour of the flame.	☐
Stage magicians always use copper.	☐
Copper conducts electricity.	☐
An element always turns the flame the same colour.	☐
Copper is cheap.	☐

[2]

[Total: 2]

2 **(a)** Look at these diagrams of the Periodic Table.

Some elements are marked with an **X**.



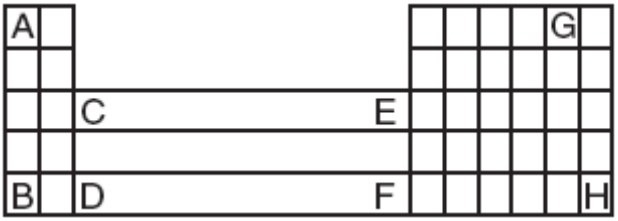
(i) Which diagram, **A**, **B**, **C** or **D**, shows a **group** of elements?

answer ..... **[1]**

(ii) Which diagram, **A**, **B**, **C** or **D**, shows a **period** of elements?

answer ..... **[1]**

(b) Which **two** letters below represent **non-metals**?

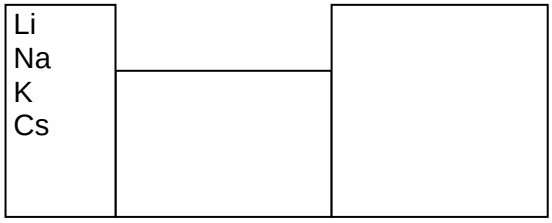


answer …… and …… **[2]**

[Total: 4]

3 Jenny studies four elements Li, Na, K and Cs.

She finds this information in a book.



PERIODIC TABLE

	boiling point in °C
Li	1342
Na	883
K	760

(a) The book does not list data for the element Cs.

Suggest a value for the boiling point of Cs.

Give reasons for your answer. boiling point = ... °C

.....

.....

.....

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

(b) Jenny carefully adds some potassium to cold water.

Describe what she sees.

Include a word equation for the reaction.

.....

.....

.....

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

[Total: 5]

4 Jenny fills in a table about the halogens at room temperature and pressure.

Use words from the lists below to complete the table.

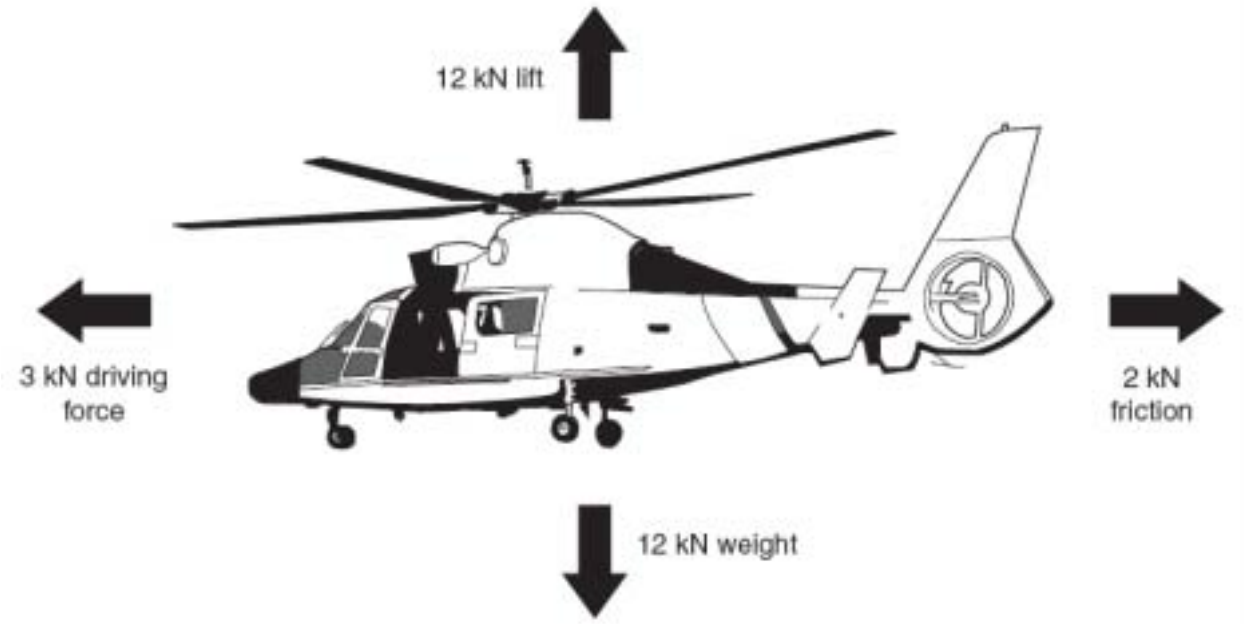
solid	**green**
liquid	**grey**
gas	**red/brown**
	white
	yellow

name of element	state of element	colour of element
chlorine		
bromine		
iodine		

[3]

[Total: 3]

5 The diagram shows the forces acting on a helicopter in level flight.



(a) What is the **direction** of the resultant force on the helicopter?

Put a (ring) around the correct answer.

backwards **downwards** **forwards** **upwards** **[1]**

(b) What is the **size** of the resultant force on the helicopter?

Put a (ring) around the correct answer.

1 kN **2 kN** **3 kN** **5 kN** **12 kN** **[1]**

(c) Which quantities will be **increasing** for the helicopter?

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

Height	☐
Weight	☐
Momentum	☐
Kinetic energy	☐
Gravitational potential energy	☐

[2]

[Total: 4]

6 Paul drives a taxi in town.

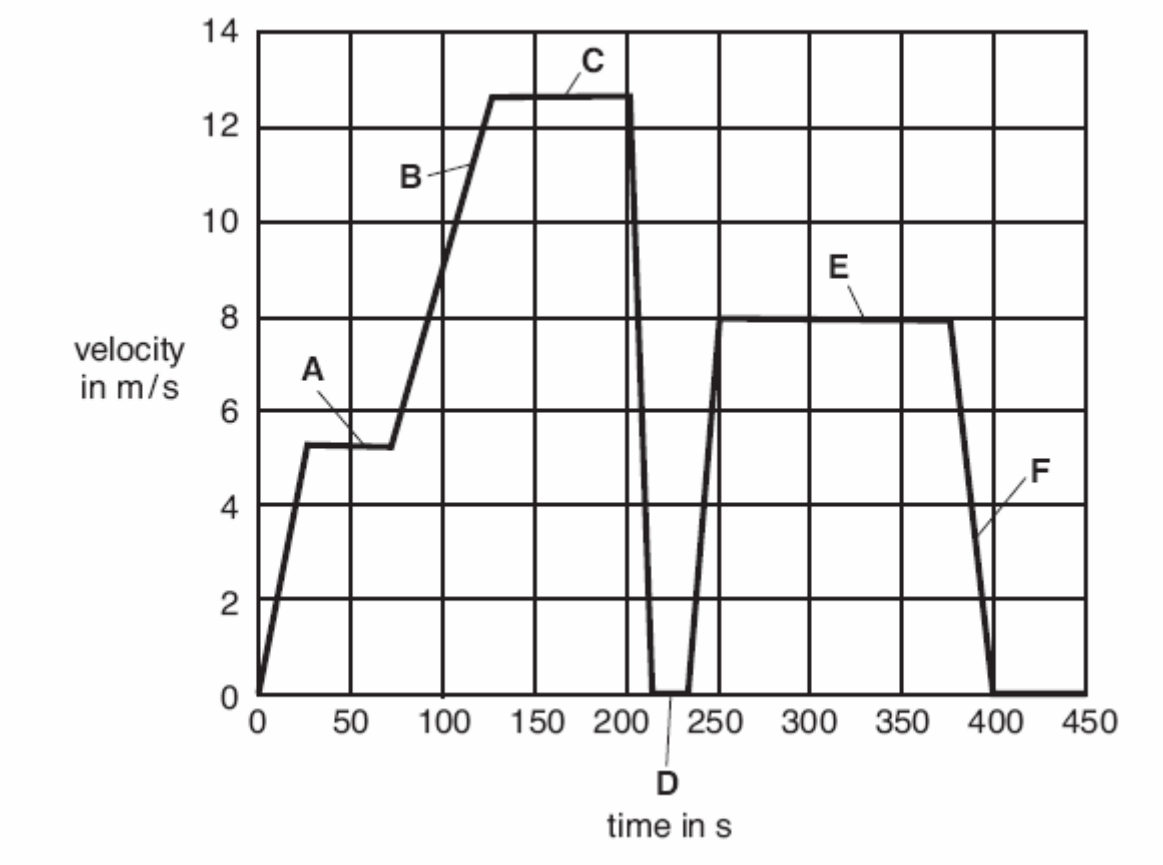
(a) A journey of 3000 m takes him 400 s.

Calculate the average speed for the journey.

Show your working.

average speed = ... m/s **[2]**

(b) Here is a velocity-time graph for Paul's journey.



At what point in the journey is Paul moving at a steady top speed?

Put a ring around the answer.

A **B** **C** **D** **E** **F** **[1]**

(c) Paul wears a seatbelt. He brakes suddenly at traffic lights.

Explain how the seatbelt protects Paul.

.....

.....

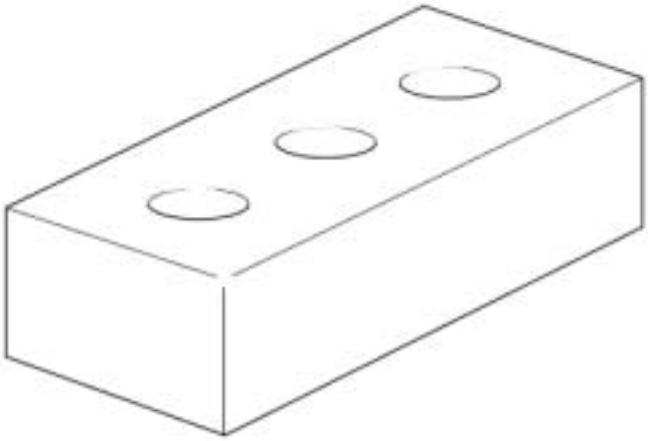
.....

.....

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

[Total: 6]

7 Julie drops a brick down a deep well.



The brick falls through the air until it hits the water.

(a) Finish the sentences. Choose words from this list.

gravitational potential energy

kinetic energy

mass

volume

weight

work

The brick is pulled down by its ..... .

As it falls, the brick loses .....

but gains ..... . **[3]**

(b) The brick has a weight of 20 N. It falls for 4 s before it hits the water.

The momentum of the brick changes as it falls through the air.

How do you calculate the change in momentum?

Put a (ring) around the correct answer.

$\frac{20}{4}$ 20×4 $\frac{4}{20}$

[1]

[Total: 4]

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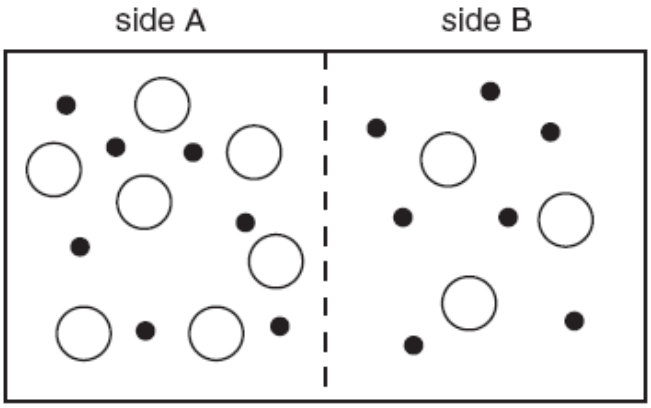
Question 8 starts on page 12

PLEASE DO NOT WRITE ON THIS PAGE

8 Andrew draws a model to show osmosis.



= glucose molecule

= water molecule

= partially permeable membrane

(a) What does side B in the model represent?

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

a concentrated solution ☐

a dilute solution ☐

pure water ☐

[1]

(b) Why did Andrew include a partially permeable membrane in his model?

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

To stop glucose molecules and water molecules from passing through. ☐

To stop glucose molecules from passing through. ☐

To stop water molecules from passing through. ☐

[1]

(c) What happens to the water molecules?

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

Water molecules move mostly from side **A** to side **B**. ☐

Water molecules move mostly from side **B** to side **A**. ☐

Water molecules move equally between side **A** and side **B**. ☐

Water molecules do not move between side **A** and side **B**. ☐

[1]

(d) What will happen when Andrew adds four more glucose molecules to **side B** in his model?

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

Water molecules move mostly from side **A** to side **B**. ☐

Water molecules move mostly from side **B** to side **A**. ☐

Water molecules move equally between side **A** and side **B**. ☐

Water molecules do not move between side **A** and side **B**. ☐

[1]

[Total: 4]

9 This question is about enzymes.

(a) What are enzymes made of?

Put a (ring) around the correct answer.

carbohydrates **lipids** **proteins** **[1]**

(b) Enzymes can speed up the breakdown of molecules.

Which of the following statements are **true** and which are **false**?

Write **true** or **false** in the box next to each statement.

	true or **false**
Enzymes can make reactions go faster.	
Enzymes will only work in test tubes.	
Enzymes stop working at very high temperatures.	
Enzymes work best at one particular temperature.	

[2]

(c) Enzymes can speed up the breakdown of molecules.

This can be explained with the lock-and-key model.

Describe the lock-and-key model for enzyme action.

.....

.....

.....

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

[Total: 5]

10 This question is about the kidneys.

(a) Drinking a glass of water increases the amount of water in your body.

(i) Here are some processes in the body.

Which one increases the amount of water in your body?

Put a (ring) around the answer.

dehydration **exhalation** **inspiration** **respiration** **[1]**

(ii) Your body can lose water by excreting urine.

Describe two other ways in which your body can lose water.

1 .....

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

(b) Drinking large amounts of alcoholic drinks can cause dehydration.

Why does this happen?

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

The kidneys stop working totally.	☐
The kidneys produce more urine.	☐
The kidneys produce less urine.	☐

[1]

(c) If someone uses the drug ecstasy they produce small amounts of very strong urine.

Draw **one** straight line from the correct change in the **volume of urine** to the correct change in its **concentration** caused by the drug ecstasy.

volume of urine	**concentration**
greater	less dilute
smaller	more dilute
stays the same	stays the same

[1]

[Total: 5]

END OF QUESTION PAPER

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	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											27 **Al** aluminium 13	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	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **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						

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

RECOGNISING ACHIEVEMENT

CONFIDENTIAL

GCSE Unit

MARK SCHEME

SAMPLE ASSESSMENT MATERIAL
(from 2010 onwards)

Additional Science A (J631)
Modules B4, C4 and P4
Foundation Tier

A215/01

Maximum Mark: 42

Guidance for Examiners

Additional Guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, e.g. mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

   / = alternative and acceptable answers for the same marking point
   (1) = separates marking points
   not/reject = answers which are not worthy of credit
   ignore = statements which are irrelevant - applies to neutral answers
   allow/accept = answers that can be accepted
   (words) = words which are not essential to gain credit
   <u>words</u> = underlined words must be present in answer to score a mark
   ecf = error carried forward
   AW/owtte = alternative wording
   ORA = or reverse argument

   E.g. mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)
   work done = 0 marks
   work done lifting = 1 mark
   change in potential energy = 0 marks
   gravitational potential energy = 1 mark

5. If a candidate alters his/her response, examiners should accept the alteration.
6. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.
7. The list principle:
   If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, e.g. one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

8. Marking method for tick boxes:

   Always check the additional guidance.

   If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.
   If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, e.g. shading or crosses.
   Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

   E.g. If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

   the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third <u>should be blank</u> (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

Question			Expected Answers	Marks	Rationale
1			elements change colour of flame ✓ (1) element turns flame same colour ✓ (1)	2	one mark per correct tick **deduct** one mark for each incorrect tick if more than two ticks used
			Total	**2**	

Question			Expected Answers	Marks	Rationale
2	a	i	B (1)	1	
		ii	A (1)	1	
	b		G (1) H (1)	2	
			Total	**4**	

Question			Expected Answers	Marks	Rationale
3	a		• answer between 740 and 640 • Cs below K (in the table) • boiling point decreases as you go down the table	3	
	b		any two of the following for [1] • fizzes • purple flame • melts • moves around on surface potassium + water = potassium hydroxide + hydrogen [1]	2	
			Total	**5**	

Question			Expected Answers	Marks	Rationale
4			<table><tr><th></th><th>state</th><th>colour</th></tr><tr><td>chlorine</td><td>gas</td><td>green</td></tr><tr><td>bromine</td><td>liquid</td><td>red/brown</td></tr><tr><td>iodine</td><td>solid</td><td>grey</td></tr></table>	3	6 correct (3) 4 or 5 correct (2) 2 or 3 correct (1) for red/brown **allow** one or both from the pair
			Total	**3**	

Question			Expected Answers	Marks	Rationale
5	**a**		forwards (1)	1	
	b		1 kN (1)	1	
	c		momentum ✓ (1) kinetic energy ✓ (1)	2	
			Total	**4**	

Question			Expected Answers	Marks	Rationale
6	a		correct answer of 7.5 m/s for [2] 3000/400 for [1] if answer incorrect	2	
	b		C	1	3 correct (2) 1 or 2 correct (1)
	c		any three of the following, [1] each • applies a force to stop him • stops him slowly • stretches to absorb his energy • reduces his momentum • stops him hitting the steering wheel / dashboard	3	
			Total	**6**	

Question			Expected Answers	Marks	Rationale
7	a		weight (1) gravitational potential energy (1) kinetic energy (1)	3	allow GPE for gravitational potential energy
	b		$\frac{20}{4}$ $\quad$ (20×4) $\quad$ $\frac{4}{20}$	1	
			Total	**4**	

Question			Expected Answers	Marks	Rationale
8	a		a dilute solution ✓ (1)	1	
	b		stop glucose molecules passing ✓ (1)	1	
	c		move mostly from side B to side A ✓ (1)	1	
	d		equally between side A and side B ✓ (1)	1	
			Total	**4**	

Question			Expected Answers	Marks	Rationale
9	a		proteins (1)	1	
	b		can make reactions go faster – true will only work in test tubes – false stop working at very high temp – true work best at one particular temp – true	2	4 correct (2) 3 correct (1)
	c		molecule is the key, enzyme is the lock [1] key must have the right shape to fit the lock [1]	2	
			Total	**5**	

Question			Expected Answers	Marks	Rationale
10	a	i	respiration for [1]	1	
		ii	any two of the following, [1] each • sweating (on the skin) • excreting faeces (owtte) • breathing out ACCEPT spitting / blowing nose for [1]	2	
	b		kidneys produce more urine ✓ (1)	1	
	c		less dilute smaller	1	More than one line = 0
			Total	**5**	

			Section total	**42**	