Pearson Edexcel

INTERNATIONAL GCSE

Science (Single Award) (9-1)

SAMPLE ASSESSMENT MATERIALS

Pearson Edexcel International GCSE in Science (Single Award) (4SS0)

For first teaching September 2017
First examination June 2019
Issue 2

Edexcel, BTEC and LCCI qualifications

Edexcel, BTEC and LCCI qualifications are awarded by Pearson, the UK's largest awarding body offering academic and vocational qualifications that are globally recognised and benchmarked. For further information, please visit our qualifications website at qualifications.pearson.com. Alternatively, you can get in touch with us using the details on our contact us page at qualifications.pearson.com/contactus

About Pearson

Pearson is the world's leading learning company, with 35,000 employees in more than 70 countries working to help people of all ages to make measurable progress in their lives through learning. We put the learner at the centre of everything we do, because wherever learning flourishes, so do people. Find out more about how we can help you and your learners at qualifications.pearson.com

References to third party material made in these sample assessment materials are made in good faith. Pearson does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

All information in this document is correct at time of publication.

ISBN 978 1 446 93431 9

Summary of Pearson Edexcel International GCSE in Science (Single Award) sample assessment materials
Issue 2 changes

Summary of changes made between previous issue and this current issue	Page number
The wording of the mark scheme for question 6 in *Paper 1: Biology* has been amended as follows: An answer that makes reference to six of the following points: • C range of different pHs/use acid and alkali/use buffer solutions (1) • O amylase from same source/starch being digested from same source (1) • R repeat readings at each pH (1) • M1 how rate of digestion judged e.g. change in iodine test for starch/(time until) no change in iodine solution/(time until) production of positive Benedict's test (1) • M2 reference to time period (1) • S1 and S2 variables kept constant e.g. same volume of amylase/same concentration of amylase/same mass of substrate/same temperature or use of water bath (2)	26

Earlier issue shows previous changes.
If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

Contents

Introduction

The Pearson Edexcel International GCSE in Science (Single Award) is designed for use in schools and colleges. It is part of a suite of International GCSE qualifications offered by Pearson.

These sample assessment materials have been developed to support this qualification and will be used as the benchmark to develop the assessment students will take.

General marking guidance

- All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme - not according to their perception of where the grade boundaries may lie.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
- Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification/indicative content will not be exhaustive. However, different examples of responses will be provided at standardisation.
- Where examiners are in doubt regarding the application of the mark scheme to a candidate's response, a senior examiner must be consulted before a mark is given.
- Crossed-out work should be marked **unless** the candidate has replaced it with an alternative response.

Subject specific marking guidance

Symbols, terms used in the mark scheme

- Round brackets ( ): words inside round brackets are to aid understanding of the marking point but are not required to award the point.
- Curly brackets { }: indicate the beginning and end of a list of alternatives (separated by obliques), where necessary, to avoid confusion.
- Oblique /: words or phrases separated by an oblique are alternatives to each other and either answer should receive full credit.
- ecf: indicates error carried forward which means that a wrong answer given in an early part of a question is used correctly to a later part of a question.

You will not see 'owtte' (or words to that effect). Alternative correct wording should be credited in every answer unless the mark scheme has specified otherwise.

The Additional Guidance column is used for extra guidance to clarify any points in the mark scheme. It may be used to indicate:

- what will not be accepted for that marking point in which case the phrase 'do not accept' will be alongside the relevant marking point.
- It might have examples of possible acceptable answers which will be adjacent to that marking point.

Write your name here

Surname	Other names

Pearson Edexcel International GCSE (9-1)

Centre Number | | | | | |

Candidate Number | | | | |

Science (Single Award)
Biology

Sample Assessment Materials for first teaching September 2017

Time: 1 hour 10 minutes

Paper Reference **4SS0/1B**

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Calculators may be used.
- Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

S54847A

1/1/

S 5 4 8 4 7 A 0 1 1 6

Pearson

Answer ALL questions. Write your answers in the spaces provided.

1 All living organisms have certain characteristics.

(a) Describe what is meant by the following characteristics:

(i) respiration

(2)

(ii) control of their internal conditions

(2)

(b) Organisms are organised into different levels.

What is the correct order of the levels?

(1)

☒ **A** organ, system, tissue, cell, organelle

☒ **B** organ, tissue, cell, system, organelle

☒ **C** organelle, cell, tissue, organ, system

☒ **D** system, cell, organelle, organ, tissue

(c) Yeast is an example of which group of organism?

(1)

☒ **A** animals

☒ **B** bacteria

☒ **C** fungi

☒ **D** protoctists

(Total for Question 1 = 6 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

2 Feeding relationships can be shown using food chains.

This food chain comes from a woodland ecosystem.

oak tree → earthworm → vole → hawk

(a) Name the secondary consumer in this food chain.

(1)

.....

(b) (i) Draw a pyramid of numbers for this food chain.
Label your pyramid.

(3)

(ii) Describe how a pyramid of biomass would look different to a pyramid of numbers.

(2)

.....

.....

.....

.....

(iii) Explain why the biomass changes moving up the pyramid.

(3)

.....

.....

.....

.....

.....

.....

(Total for Question 2 = 9 marks)

3 A study investigates the effect of training on athletic performance.

In the study, the number of capillaries in the muscle tissue of a person is measured before and after a six-week period of training.

(a) The table shows the results.

Mean number of capillaries per mm²	
before training	after training
437	460

(i) Explain how training may affect the athletic performance of this person. Use information from the table to support your answer.

(5)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(ii) Give **two** ways in which the design of the study could be improved.

(2)

1 .....

.....

2 .....

.....

(b) The diameter of a capillary is 8.0 μm and the diameter of the aorta is 25.0 mm.
1000 μm = 1 mm

(i) Calculate the ratio of the diameter of the aorta to the diameter of the capillary.
Show your working.

(2)

ratio = ...

(ii) Explain why the aorta has a thicker wall than the capillary.

(2)

.....

.....

.....

.....

.....

.....

(Total for Question 3 = 11 marks)

4 Genetic conditions can be controlled by dominant alleles or by recessive alleles.

(a) Explain **one** difference between a dominant allele and a recessive allele.

(2)

(b) Sickle cell anaemia is a genetic condition that results in the formation of abnormal red blood cells.

Sickle cell anaemia is controlled by a gene with two alleles. The allele (N) produces normal red blood cells and the allele (n) produces abnormal red blood cells.

Two parents who are both heterozygous plan to have children.

Use a genetic diagram to show the parent genotypes, the gametes produced and all the possible genotypes and phenotypes of their offspring.

(3)

Parent genotypes

Gametes

Offspring genotypes

Offspring phenotypes

(c) Individuals who are heterozygous for sickle cell anaemia are protected from malaria.

Suggest how this would affect the number of individuals born with sickle cell anaemia in parts of the world where malaria is common.

(4)

(Total for Question 4 = 9 marks)

5 Plants make sugars by the process of photosynthesis.

(a) (i) Which of the following factors is least likely to limit the rate of photosynthesis?

(1)

☒ **A** carbon dioxide concentration

☒ **B** light intensity

☒ **C** oxygen concentration

☒ **D** temperature

(ii) Which combination of factors is most likely to limit the rate of photosynthesis in the early morning?

(1)

☒ **A** carbon dioxide concentration and soil pH

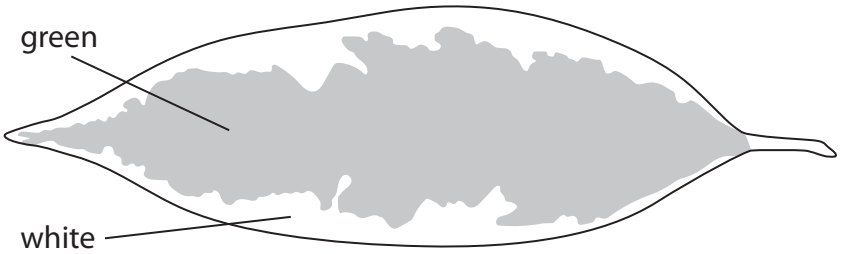
☒ **B** temperature and light intensity

☒ **C** water content of soil and soil pH

☒ **D** water content of soil and light intensity

(b) A student carried out an experiment to investigate the need for chlorophyll in photosynthesis.

He uses a variegated leaf as shown.



The green part of the leaf has cells that contain chlorophyll. The white part of the leaf has cells that do not contain chlorophyll.

(i) Describe the procedure used to test this leaf for starch.

(4)

(ii) Draw a labelled diagram of the leaf to show its appearance after the student had completed the test for starch.

(2)

(c) Suggest a method the student could use to measure the area of the green part of the leaf.

(2)

.....

.....

.....

.....

.....

.....

(Total for Question 5 = 10 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

6 Describe an experiment you could carry out to determine the effect of pH on the rate of digestion by amylase.

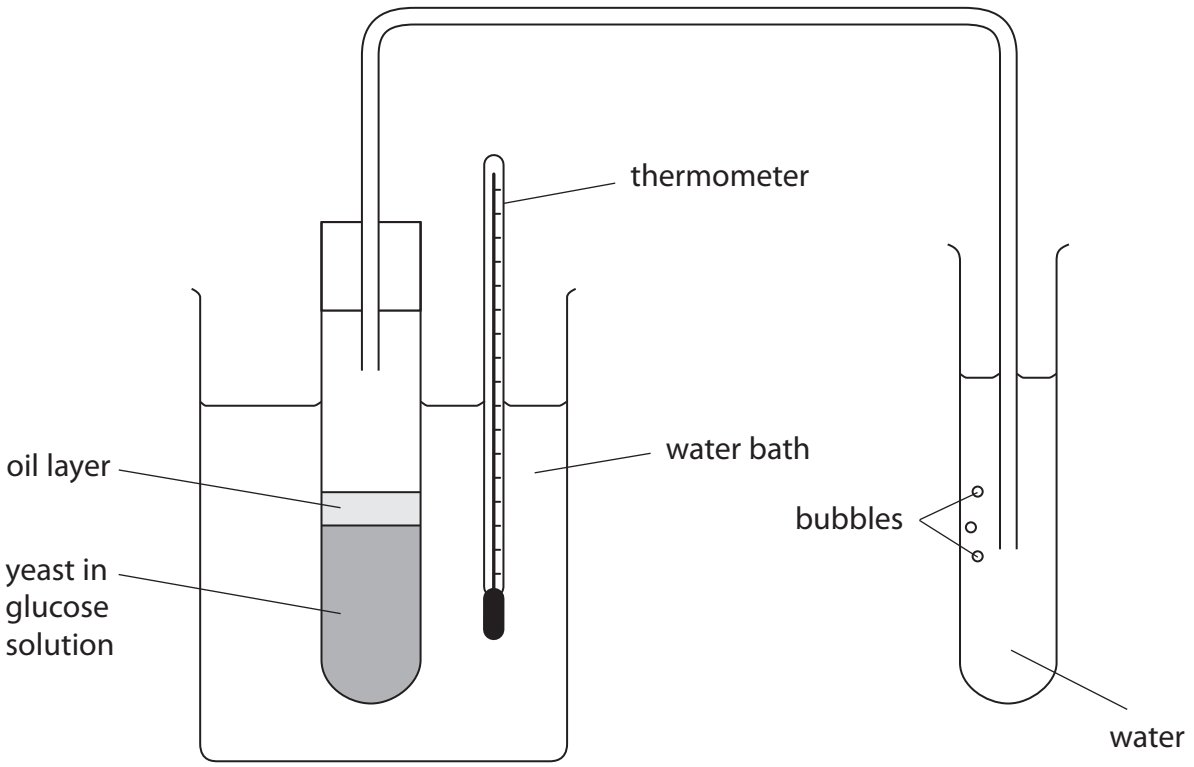
Your answer should include experimental details and be written in full sentences.

(6)

(Total for Question 6 = 6 marks)

7 A student wants to investigate the effect of temperature on the rate of anaerobic respiration by yeast.

She set up this apparatus.



(a) The oil layer prevents the entry of air into the glucose solution.

Explain why this is necessary.

(2)

.....

.....

.....

.....

(b) The student varies the temperature of the water bath between 15 °C and 60 °C.

She measures the rate of respiration by counting the number of carbon dioxide bubbles produced per minute.

These are her results.

Temperature / °C	Number of bubbles produced in one minute				
	trial 1	trial 2	trial 3	trial 4	trial mean
15	6	7	5	5	6
20	7	8	7	9	8
35	10	12	11	14	
45	12	15	14	16	14
60	3	2	1	2	2

(i) Calculate the mean number of bubbles produced in one minute at 35 °C.

(2)

mean number of bubbles in one minute = ...

(ii) Calculate the percentage change in the mean number of bubbles produced in one minute as the temperature increases from 15 °C to 45 °C.

(2)

percentage change = ...%

(iii) Explain the change in the rate of respiration by yeast as the temperature increases from 45 °C to 60 °C.

(3)

(Total for Question 7 = 9 marks)

TOTAL FOR PAPER = 60 MARKS

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Paper 1 (4SS0/1B)

Question number	Answer	Additional guidance	Mark
1(a)(i)	A description that makes reference to the following two points: • release of energy (1) • within cells (1)	reject production of energy	**2**

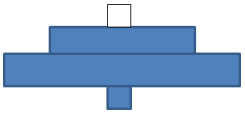
Question number	Answer	Additional guidance	Mark
1(a)(ii)	A description that makes reference to the following points: • keeping named characteristic, e.g. temperature (1) • constant within narrow range (1)	allow blood glucose/carbon dioxide/blood pressure/water content/equivalent	**2**

Question number	Answer	Mark
1(b)	C	**1**

Question number	Answer	Mark
1(c)	C	**1**

Total for Question 1 = 6 marks

Question number	Answer	Mark
2(a)	Vole	**1**

Question number	Answer	Additional guidance	Mark
2(b)(i)	A drawing that includes the following points: • organisms named (1) • in correct order (1) • correct shape (1)		**3**

Question number	Answer	Mark
2(b)(ii)	A description that makes reference to the following points: • larger base for oak tree (1) • pyramid/equivalent shape described (1)	**2**

Question number	Answer	Additional guidance	Mark
2(b)(iii)	An explanation that makes reference to three of the following points: • not all energy transferred between each level (1) • less energy at each stage (1) • fewer organisms/less biomass supported (1) • example of energy loss, e.g. to enable respiration/not all organism eaten/not all digested/some excreted/equivalent (1)	reject energy used in respiration	**3**

Total for Question 2 = 9 marks

Question number	Answer	Mark
3(a)(i)	An explanation that makes reference to the following five points: • training improves performance by increasing the number of capillaries (1) • better supply of oxygen/aerobic (1) • better supply of glucose (1) • respiration/energy/ATP (1) • muscle contraction (1) • better removal of lactic acid/carbon dioxide (1) • can run for longer/equivalent (1)	**5**

Question number	Answer	Mark
3(a)(ii)	An answer that makes reference to two of the following points: • use more people (1) • extend training period (1) • compare different ages/genders (1)	**2**

Question number	Answer	Additional guidance	Mark
3(b)(i)	Multiplication • 0.008 (1) Division • 25 ÷ 0.008 = 3125 = 3100 (1)	award full marks for correct numerical answer without working accept 3125 the final answer should reflect the precision of the least precise data (in this case two sig figs)	**2**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An explanation that makes reference to two of the following points: • wall contains muscle/elastic tissue (1) • blood is under high pressure from the left ventricle (1) • aorta needs to expand (1) • need to transport more blood (1)	allow converse	**2**

Total for Question 3 = 11 marks

Question number	Answer	Additional guidance	Mark
4(a)	An explanation that makes reference to two of the following points: • dominant allele always expressed (1) • dominant expressed in heterozygote (and homozygote)/recessive allele not expressed in heterozygote (1) • recessive allele only expressed in phenotype of homozygote/equivalent (1)	allow seen/visible	**2**

Question number	Answer	Additional guidance	Mark
4(b)	A genetic diagram including: • parents Nn and Nn (1) • gametes N or n (1) • genotypes of offspring NN Nn Nn nn and phenotypes correctly assigned (1)	allow max 3 for transfer error allow all marks from Punnett square	**3**

Question number	Answer	Additional guidance	Mark
4(c)	An answer that makes reference to the following points: • Nn not affected/killed by malaria/survive (1) • reproduce (1) • so number of Nn individuals increase (1) • so number of nn individuals increases/frequency of (n) allele increases (1)	allow converse for NN	**4**

Total for Question 4 = 9 marks

Question number	Answer	Mark
5(a)(i)	C	1

Question number	Answer	Mark
5(a)(ii)	B	1

Question number	Answer	Mark
5(b)(i)	A description that makes reference to four of the following points: • place leaf in boiling water (1) • place leaf in boiling ethanol (1) • use water bath/safe heating/no naked flame (1) • place leaf in water (1) • place leaf in iodine solution (1) • blue/black indicates starch; orange/yellow indicates no starch (1)	4

Question number	Answer	Additional guidance	Mark
5(b)(ii)	A drawing showing the following: • white part labelled orange/yellow/no starch (1) • green part labelled blue/black/starch (1)	allow approximate shape	2

Question number	Answer	Mark
5(c)	A method that includes two of the following points: • trace around the leaf/use transparent paper/equivalent (1) • trace around the green part (1) • put onto squared paper (1) • count the number of squares (1) • reference to both sides of leaf being measured (1)	2

Total for Question 5 = 10 marks

Question number	Answer	Mark
6	An answer that makes reference to six of the following points: • C range of different pHs/use acid and alkali/use buffer solutions (1) • O amylase from same source/starch being digested from same source (1) • R repeat readings at each pH (1) • M1 how rate of digestion judged e.g. change in iodine test for starch/(time until) no change in iodine solution/(time until) production of positive Benedict's test (1) • M2 reference to time period (1) • S1 and S2 variables kept constant e.g. same volume of amylase/same concentration of amylase/same mass of substrate/same temperature or use of water bath (2)	**6**

Total for Question 6 = 6 marks

Question number	Answer	Additional guidance	Mark
7(a)(i)	An explanation that makes reference to the following: • to exclude oxygen (1) • ensure respiration is anaerobic (1)	ignore reference to air	**2**

Question number	Answer	Additional guidance	Mark
7(b)(i)	• Addition of readings 10 + 12 + 11 + 14 = 47 (1) • Division by 4 47 ÷ 4 = 12 (11.75) (1) round to 12 for correct sig figs	award full marks for correct numerical answer without working	**2**

Question number	Answer	Additional guidance	Mark
7(b)(ii)	• Subtraction of means 14 – 6 =8 (1) • Division by original rate x 100 8 ÷ 6 = 1.33 × 100 = 133% (1)	award full marks for correct numerical answer without working	**2**

Question number	Answer	Additional guidance	Mark
7(b)(iii)	An explanation that makes reference to three of the following points: • increased temperature causes vibrations/ breaks bonds (1) • causes change in shape of active site (1) • enzyme denatures (1) • substrate can no longer fit in/bind with enzyme (1)	reject reference to enzyme being killed	**3**

Total for Question 7 = 9 marks

TOTAL FOR PAPER = 60 MARKS

Write your name here

Surname	Other names

Pearson Edexcel International GCSE (9 - 1)

Centre Number	Candidate Number

Science (Single Award)

Chemistry

Sample Assessment Materials for first teaching September 2017

Time: 1 hour 10 minutes

Paper Reference

4SS0/1C

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Calculators may be used.
- Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

S54848A

1/1/

S 5 4 8 4 8 A 0 1 2 4

Pearson

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.***

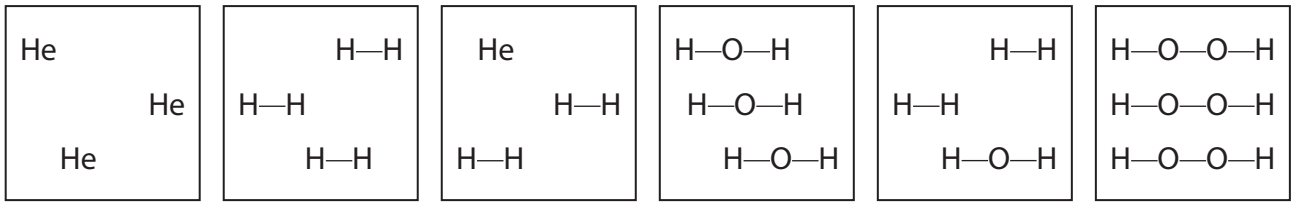
The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

BLANK PAGE

Answer ALL questions. Write your answers in the spaces provided.

1 Substances can be classified as elements, compounds or mixtures.

(a) Each of the boxes in the diagram represents either an element, a compound or a mixture.



box 1 box 2 box 3 box 4 box 5 box 6

(i) Explain which **two** boxes represent an element.

(2)

.....

.....

.....

.....

(ii) Explain which **two** boxes represent a mixture.

(2)

.....

.....

.....

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) The list gives the names of some methods used in the separation of mixtures:

- chromatography
- crystallisation
- distillation
- filtration

Use names from the list to choose a suitable method for each separation.

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

(i) Separating water from sodium chloride solution.

(1)

(ii) Separating the blue dye from a mixture of blue and red dyes.

(1)

(iii) Separating potassium nitrate from potassium nitrate solution.

(1)

(Total for Question 1 = 7 marks)

2 A student carries out a series of tests on some compounds.

(a) In some of these tests, a gas is given off. The gas is tested by placing a piece of damp litmus paper in the gas.

State the final colour of the litmus paper in the test for the gases ammonia and chlorine.

(2)

Ammonia .....

Chlorine .....

(b) Describe how to use a wooden splint to decide whether a gas is hydrogen or oxygen.

(2)

.....

.....

.....

.....

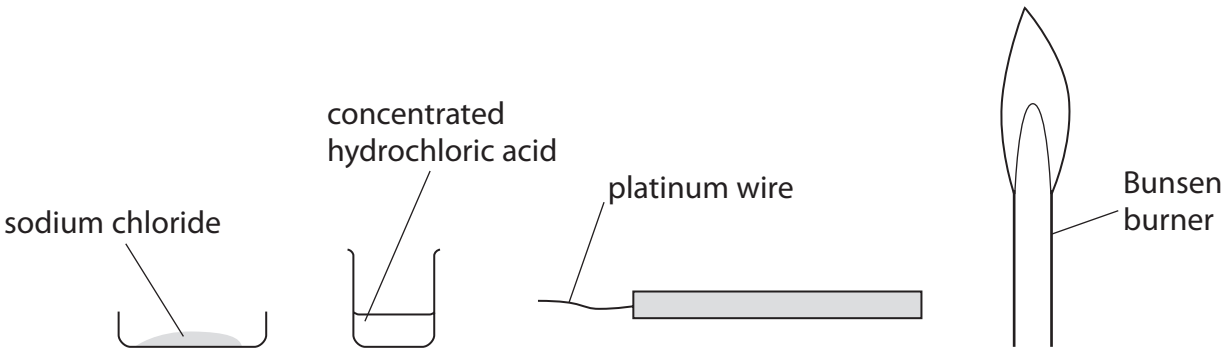
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(c) Cations in compounds can be identified using a flame test.

The diagram shows two chemicals and pieces of apparatus that can be used in this test.



Describe how you would use the chemicals and apparatus to show that the sodium ion is present in sodium chloride.

(4)

(Total for Question 2 = 8 marks)

3 This question is about the elements in Group 1 of the Periodic Table and their reactions with water.

(a) A reaction occurs when a small piece of sodium is added to a large volume of water in a trough.

(i) Give **two** observations that you would make during this reaction.

(2)

1 .....

.....

2 .....

.....

(ii) After the reaction has finished, a few drops of universal indicator are added to the solution in the trough.

Explain the final colour of the universal indicator.

(2)

.....

.....

.....

(iii) What is the most likely pH value of the solution in the trough after the reaction is complete?

(1)

☒ **A** 2

☒ **B** 5

☒ **C** 8

☒ **D** 12

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(b) A small piece of potassium is added to a large volume of water in a trough.

Give **one** observation that is made when potassium is added to water that is **not** made when sodium is added to water.

(1)

.....

.....

(c) Complete the equation for the reaction of rubidium with water.
State symbols are not required.

(1)

..... Rb + ... H_2O → ..... RbOH + ... H_2

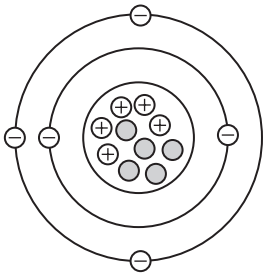
(Total for Question 3 = 7 marks)

DO NOT WRITE IN THIS AREA

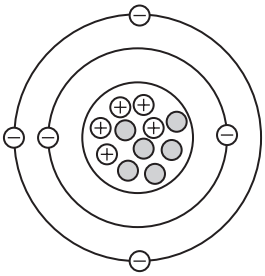
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

4 The diagram shows the structures of two different atoms.



atom 1



atom 2

(a) State how the diagram shows that both of these atoms are neutral.

(1)

.....

.....

(b) Explain how the diagram shows that these atoms are isotopes.

(2)

.....

.....

.....

.....

(c) Complete the table to show the atomic number and mass number of atoms **1** and **2**.

(2)

	Atomic number	**Mass number**
atom 1	5	
atom 2		11

(d) The table shows the mass number and percentage of two different atoms of another element.

Mass number	Percentage of atom
6	7.0%
7	93.0%

Calculate the relative atomic mass (A_r) of this element.

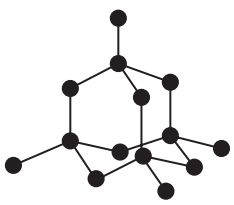
Give your answer to one decimal place.

(2)

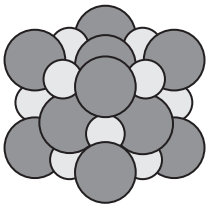
relative atomic mass = ...

(Total for Question 4 = 7 marks)

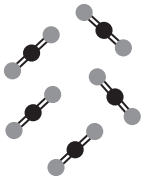
5 This question is about the bonding, structure and properties of three different substances, **X**, **Y** and **Z**, shown in the following diagram.



X



Y



Z

(a) Give the letters of the substances that contain covalent bonding.

(1)

.....

(b) Explain why the melting point of **X** is very different from the melting point of **Z**.

(4)

.....

.....

.....

.....

.....

.....

(c) Explain why the melting point of **Y** is very high.

(2)

.....

.....

.....

.....

(Total for Question 5 = 7 marks)

DO NOT WRITE IN THIS AREA

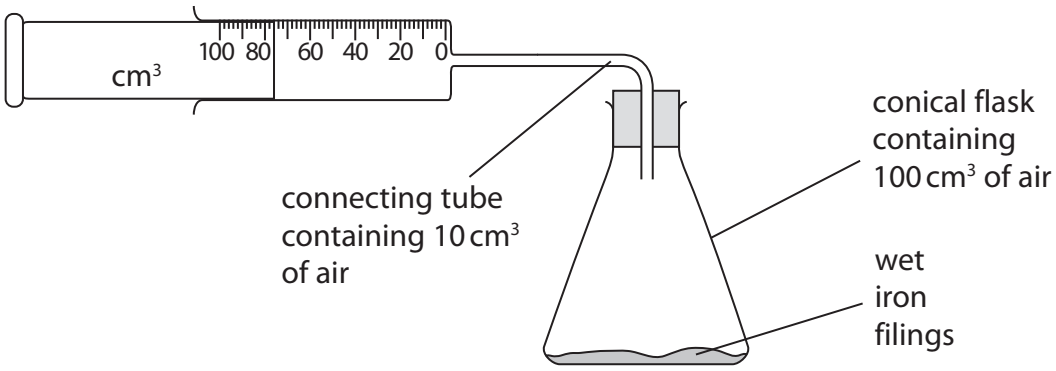
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

6 The percentage by volume of oxygen in air can be found by using the rusting of iron.

A student sets up this apparatus to measure the volume of oxygen in a sample of air.

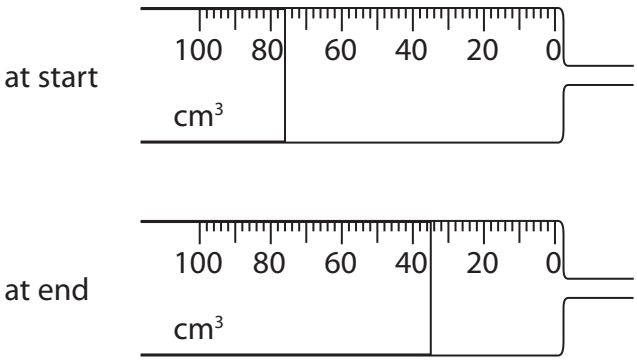


An excess of wet iron filings is used.

At the start of each experiment, the reading on the syringe is recorded and the apparatus is then left for a week so that the reaction is complete.

The reading on the syringe is then recorded again.

(a) The diagram shows the readings in one experiment.



Complete the table to show:

- the syringe reading at the end of this experiment
- the volume of oxygen used in the experiment.

(2)

syringe reading at start / cm^3	76
syringe reading at end / cm^3	
volume of oxygen used / cm^3	

(b) The table shows the results recorded by a different student in her experiment.

volume of air in conical flask / cm^3	100
volume of air in connecting tube / cm^3	10
original volume of air in syringe / cm^3	80
final volume of air in syringe / cm^3	43

Calculate the percentage of oxygen in air using these results.

(3)

percentage of oxygen = ... %

(c) The table shows some possible causes of anomalous results in this experiment.

Use terms from the box to complete the table, showing possible causes and their effects on the volume of oxygen used in this experiment.

decreased	increased	no effect

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

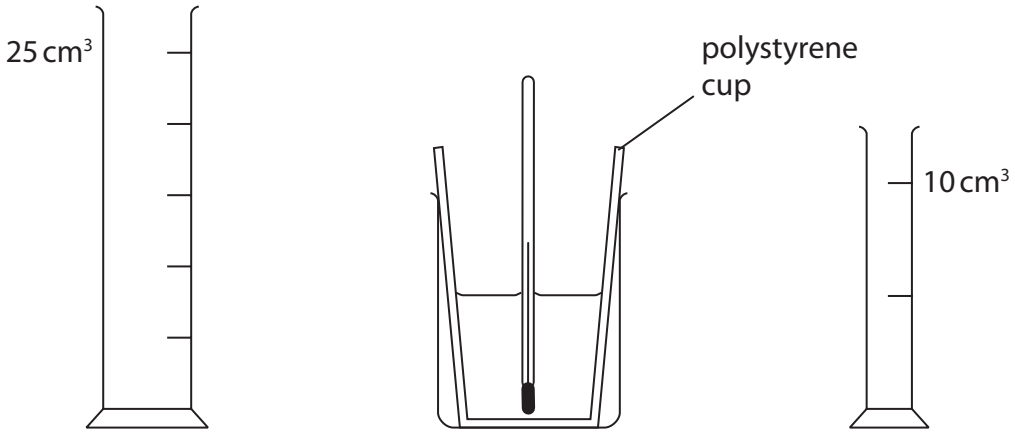
(3)

Possible cause	Effect on volume of oxygen used
wet iron filings not in excess	
apparatus left for 1 hour instead of 1 week	
apparatus left in a warmer place for 1 week	

(Total for Question 6 = 8 marks)

7 When aqueous solutions of potassium hydroxide and nitric acid are mixed together, an exothermic reaction occurs.

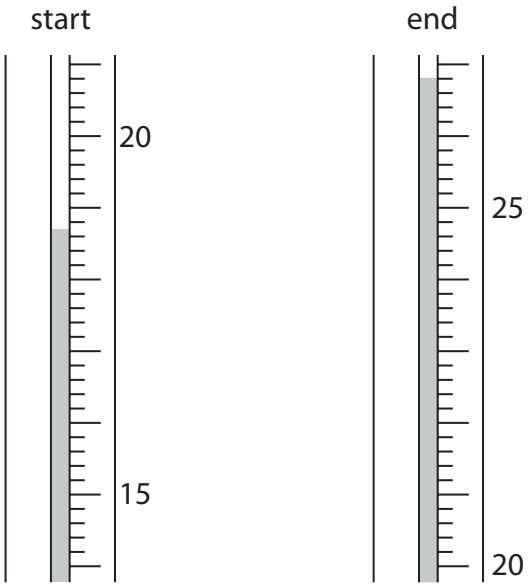
The diagram shows the apparatus used in an experiment to measure the temperature increase.



This is the student's method.

- use the larger measuring cylinder to add 25 cm^3 of aqueous potassium hydroxide to the polystyrene cup.
- record the steady temperature.
- use the smaller measuring cylinder to add 5 cm^3 of dilute nitric acid to the cup, stir the mixture with the thermometer.
- record the highest temperature of the mixture.
- continue adding further 5 cm^3 portions of dilute nitric acid to the cup, stirring and recording the temperature, until a total volume of 35 cm^3 has been added.

(a) The diagram shows the thermometer readings at the start and at the end of one experiment.



Complete the table to show:

- the thermometer reading at the start of the experiment
- the temperature rise in the experiment.

(2)

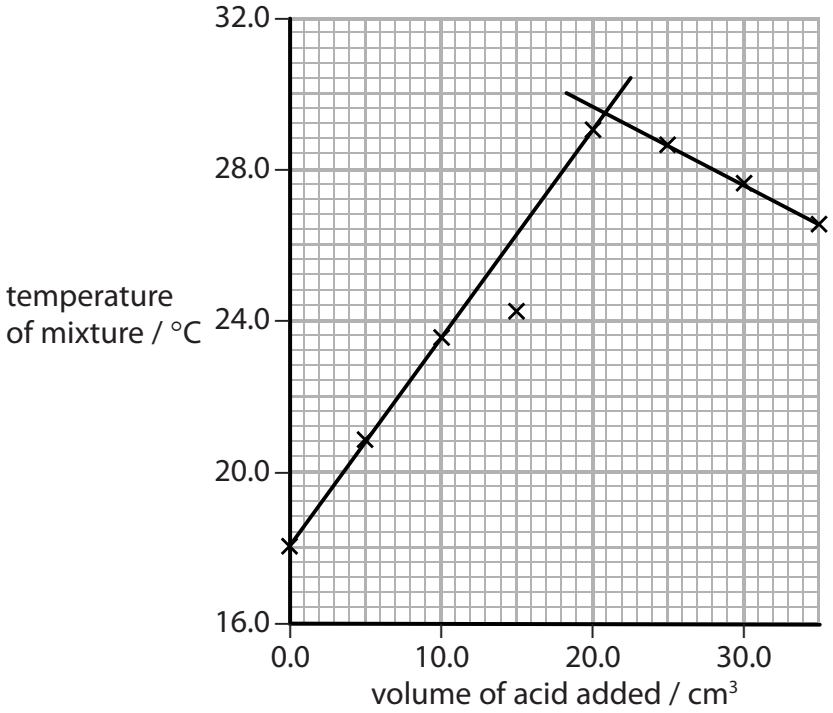
thermometer reading at end / °C	26.8
thermometer reading at start / °C	
thermometer rise / °C	

(b) Another student uses the same method, adding the dilute nitric acid from a burette.

The table shows his results.

volume of acid added / cm^3	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0
temperature of mixture / °C	18.0	20.8	23.5	24.2	29.0	28.6	27.6	26.5

This is the student's graph.



The point where the lines cross represents complete neutralisation.

(i) Identify the maximum temperature reached during the experiment.

(1)

maximum temperature = ... °C

(ii) Identify the volume of dilute nitric acid that exactly neutralises the 25 cm^3 of aqueous potassium hydroxide.

(1)

volume = ... cm^3

(c) Another student records these results.

volume of aqueous potassium hydroxide = 20.0 cm^3

starting temperature of aqueous potassium hydroxide = 18.5 °C

maximum temperature of mixture = 30.0 °C

volume of dilute nitric acid = 20.0 cm^3

Calculate the heat energy released in this experiment.

c = 4.2 J/g / °C

mass of 1 cm^3 of mixture = 1 g

(4)

heat energy = ... J

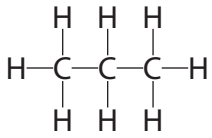
(Total for Question 7 = 8 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

8 The table shows the formulae of six organic compounds, **A**, **B**, **C**, **D**, **E** and **F**.

A	**B**	**C**
CH_4	C_2H_4	C_2H_6
D	**E**	**F**
	$CH_2{=}CH{-}CH_3$	C_4H_{10}

(a) State why each of these compounds is a hydrocarbon.

(2)

.....

.....

(b) State why the formula given for **D** is called a displayed formula.

(1)

.....

.....

(c) Give the letters that represent the four compounds with the general formula C_nH_{2n+2}

(1)

.....

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(d) Many of the compounds in the table are found in a fuel called shale gas.

Shale gas contains many different compounds, including methane, propane and hydrogen sulfide (H_2S).

(i) Complete the equation to show the complete combustion of propane.

(2)

$$C_3H_8 + 5O_2 \rightarrow \text{.....} + \text{.....}$$

(ii) When shale gas is burned, the hydrogen sulfide reacts with oxygen.

$$2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$$

Explain how the combustion of shale gas can lead to the formation of acid rain.

(2)

.....

.....

.....

.....

.....

.....

(Total for Question 8 = 8 marks)

TOTAL FOR PAPER = 60 MARKS

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Paper 2 (4SS0/1C)

Question number	Answer	Additional guidance	Mark
1(a)(i)	An explanation that makes reference to the following two points: • boxes 1 and 2 (1) • because they both have only one type of atom/molecule (1)	accept other indications, e.g. only He and only H-H accept species in place of atom/molecule second mark can be awarded if only box 1 or box 2 identified	**2**

Question number	Answer	Additional guidance	Mark
1(a)(ii)	An explanation that makes reference to the following two points: • boxes 3 and 5 (1) • box 3 contains a mixture of helium and hydrogen and box 5 contains a mixture of hydrogen and water (1)	second mark can be awarded if only box 3 or box 5 identified	**2**

Question number	Answer	Mark
1(b)(i)	Simple distillation	**1**

Question number	Answer	Mark
1(b)(ii)	Chromatography	**1**

Question number	Answer	Mark
1(b)(iii)	Crystallisation	**1**

Total for Question 1 = 7 marks

Question number	Answer	Additional guidance	Mark
2(a)	• (Ammonia) blue (1) • (Chlorine) white/colourless (1)	ignore red accept bleached	**2**

Question number	Answer	Mark
2(b)	A description that makes reference to the following two points: • (hydrogen) burning splint gives a squeaky pop (1) • (oxygen) glowing splint relights (1)	**2**

Question number	Answer	Mark
2(c)	A description that makes reference to the following four points: • dip platinum wire in acid (1) • then into sodium chloride (1) • then into Bunsen flame (1) • yellow colour with sodium ion (1)	**4**

Total for Question 2 = 8 marks

Question number	Answer	Additional guidance	Mark
3(a)(i)	A description that makes reference to any two of the following points: • sodium floats/moves across the water (1) • sodium melts/forms a ball (1) • sodium disappears/gets smaller (1) • effervescence/fizzing/bubbles/gas given off (1) • white trail (1)	accept sodium dissolves ignore name of gas	**2**

Question number	Answer	Additional guidance	Mark
3(a)(ii)	An explanation that makes reference to the following two points: • (final colour is) purple/blue (1) • because the solution is alkaline (1)	accept sodium hydroxide forms/solution has high pH	**2**

Question number	Answer	Mark
3(a)(iii)	D	**1**

Question number	Answer	Additional guidance	Mark
3(b)	Potassium catches fire	accept lilac/purple/violet flame	**1**

Question number	Answer	Additional guidance	Mark
3(c)	**2**Rb + **2**H_2O → **2**RbOH + H_2 (1)	accept multiples and fractions	**1**

Total for Question 3 = 7 marks

Question number	Answer	Additional guidance	Mark
4(a)	Equal numbers of + and – charges/equal numbers of protons and electrons	accept 5 in place of equal	**1**

Question number	Answer	Mark
4(b)	An explanation that makes reference to the following two points: • same number of protons (1) • different numbers of neutrons (1)	**2**

Question number	Answer	Mark
4(c)	• (Atom 1 mass number) 10 (1) • (Atom 2 atomic number) 5 (1)	**2**

Question number	Answer	Mark
4(d)	• Setting out of calculation • Evaluation ((6 x 7.0) + (7 x 93.0) ÷ 100) (1) = 6.9 (1)	**2**

Total for Question 4 =7 marks

Question number	Answer	Mark
5(a)	X and Z (1)	**1**

Question number	Answer	Mark
5(b)	An explanation that makes reference to the following points: • X has a higher melting point than Z (1) • because covalent bonds need to be broken in X (1) • but intermolecular forces (between molecules) need to be overcome in Z (1) • covalent bonds/bonds in X are strong and intermolecular forces/forces in Z are weak (1)	**4**

Question number	Answer	Mark
5(c)	An explanation that makes reference to any two linked of the following points: • oppositely charged ions (1) • are strongly attracted to each other (1) • so lot of energy needed to overcome the (strong forces of attraction) (1)	**2**

Total for Question 5 = 7 marks

Question number	Answer	Additional guidance	Mark
6(a)	• 35 (1) • 41 (1)	final answer consequential on syringe readings	**2**

Question number	Answer	Additional guidance	Mark
6(b)	• Calculation of volume of oxygen used • Calculation of original volume of air • Calculation of percentage Example calculation: 80 − 43 = 37 (cm^3) (1) 100 + 10 + 80 = 190 (cm^3) (1) (37 × 100) ÷ 190 (= 19.47%) = 19% (1)	accept 19.47% or 19.5%	**3**

Question number	Answer	Mark
6(c)	• Decreased (1) • Decreased (1) • No effect (1)	**3**

Total for Question 6 = 8 marks

Question number	Answer	Additional guidance	Mark
7(a)	<table><tr><td>thermometer reading at end/ºC</td><td>(26.8)</td></tr><tr><td>thermometer reading at start/ºC</td><td>18.7</td></tr><tr><td>temperature rise/ºC</td><td>8.1</td></tr></table>	1 mark for temperature at start 1 mark for temperature rise consequential on readings	**2**

Question number	Answer	Mark
7(b)(i)	29.5	**1**

Question number	Answer	Mark
7(b)(ii)	20.8	**1**

Question number	Answer	Additional guidance	Mark
7(c)	• Calculation of volume/mass of mixture • Calculation of temperature increase • Substitution of values into $q=mc\Delta T$ • Calculation of heat energy released with unit Example calculation: 20.0 + 20.0 = 40.0 (cm^3) (1) 30.0–18.5 = 11.5 (°C) (1) q = 40.0 × 4.2 × 11.5 (1) q = 1900 J (1) (1932 J)	accept 1930 accept answers to three or more significant figures	**4**

Total for Question 7 = 8 marks

Question number	Answer	Mark
8(a)	An explanation that makes reference to the following points: • (all) contain carbon and hydrogen (1) • only/but no other elements (1)	**2**

Question number	Answer	Mark
8(b)	(The only one that shows) all atoms and all bonds	**1**

Question number	Answer	Mark
8(c)	A, C, D and F	**1**

Question number	Answer	Mark
8(d)(i)	($C_3H_8 + 5O_2 \rightarrow$) $3CO_2 + 4H_2O$ • 1 mark for both product formulae correct (1) • 1 mark for balancing (1)	**2**

Question number	Answer	Additional guidance	Mark
8(d)(ii)	An explanation that makes reference to the following points: • sulfur dioxide reacts with water (1) • to form an acid (1)	accept sulfuric or sulfurous	**2**

Total for Question 8 = 8 marks

TOTAL FOR PAPER = 60 MARKS

Write your name here

Surname	Other names

Pearson Edexcel International GCSE (9-1)

Centre Number | | | | | |

Candidate Number | | | | |

Science (Single Award)

Physics

Sample Assessment Materials for first teaching September 2017

Time: 1 hour 10 minutes

Paper Reference

4SS0/1P

You must have:
Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- Calculators may be used.
- Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

S54849A

1/1/

S 5 4 8 4 9 A 0 1 2 4

Pearson

EQUATIONS

You may find the following equations useful.

$$\text{power} = \frac{\text{work done}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{power} = \frac{\text{energy transferred}}{\text{time taken}} \qquad P = \frac{W}{t}$$

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}} \qquad V = \frac{2 \times \pi \times r}{T}$$

$$\text{pressure} \times \text{volume} = \text{constant} \qquad p_1 \times V_1 = p_2 \times V_2$$

$$\frac{\text{pressure}}{\text{temperature}} = \text{constant} \qquad \frac{p_1}{T_1} = \frac{p_2}{T_2}$$

Where necessary, assume the acceleration of free fall, g = 10 m/s^2.

Answer ALL questions in this section. Write your answers in the spaces provided.

1 (a) Which of these objects orbits a planet?

(1)

☒ **A** comet

☒ **B** dwarf star

☒ **C** galaxy

☒ **D** moon

(b) What is the correct name for our galaxy?

(1)

☒ **A** Crab Nebula

☒ **B** Milky Way

☒ **C** Solar System

☒ **D** Universe

(c) Which of these objects has the largest mass?

(1)

☒ **A** artificial satellite

☒ **B** comet

☒ **C** Earth

☒ **D** Sun

(d) Which of these stars is the coolest?

(1)

☒ **A** blue star

☒ **B** orange star

☒ **C** red star

☒ **D** yellow star

(Total for Question 1 = 4 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

2 Sound travels as a wave.

(a) A buzzer produces a sound wave of frequency 2.9 kHz and wavelength 12 cm.

(i) State the equation relating wave speed, frequency and wavelength.

(1)

.....

(ii) Calculate the speed of the sound wave.

(3)

speed = ... m/s

(b) Some electromagnetic waves are dangerous to people.

Describe how the dangers of these electromagnetic waves vary with wavelength.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 2 = 8 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

TURN OVER FOR QUESTION 3

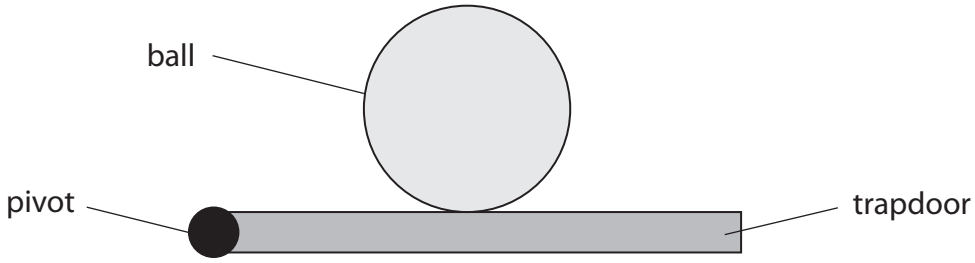
3 This question is about the motion of a ball.

(a) A ball is at rest on a trapdoor.

Complete the diagram to show the forces acting on the ball.

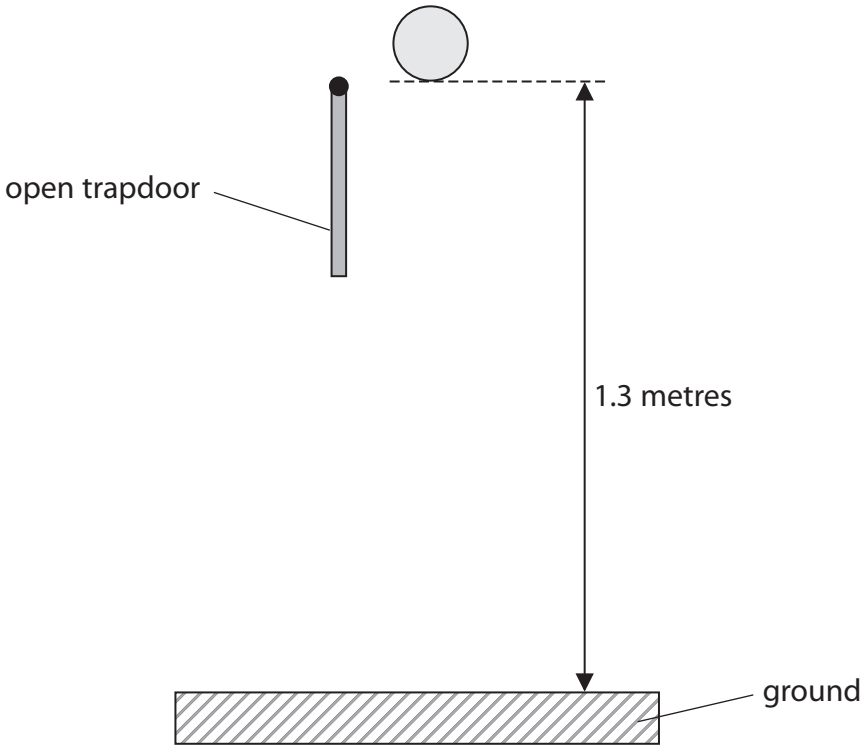
Label the forces.

(3)

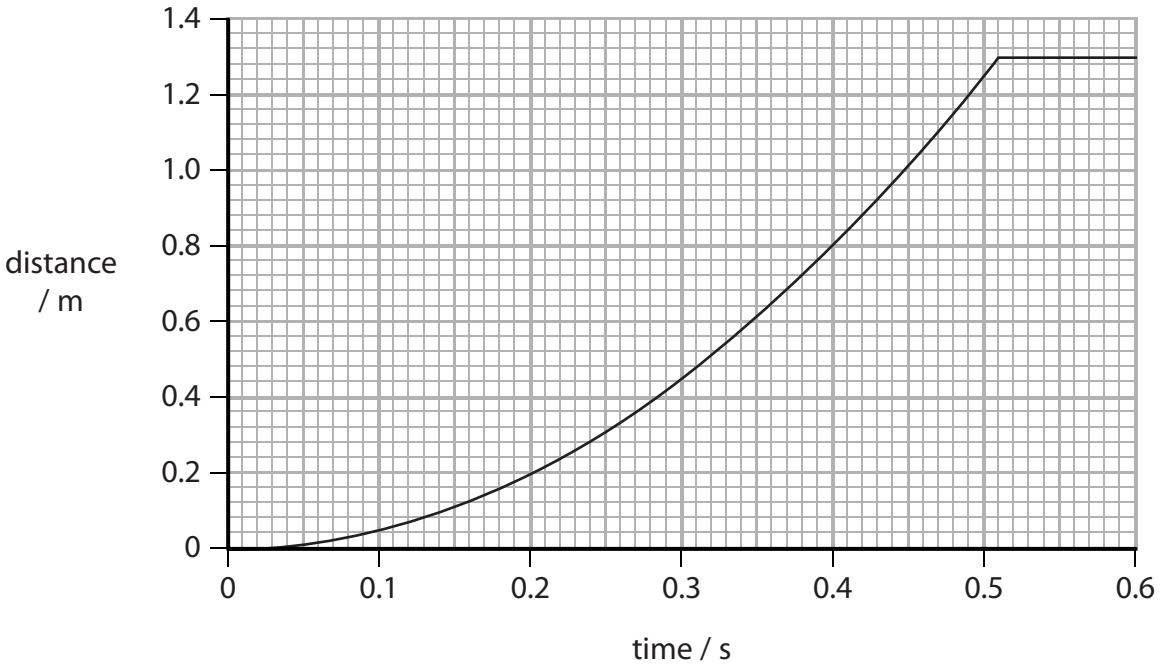


(b) The trapdoor swings open and the ball falls to the ground.

The ball does not bounce when it hits the ground.



The graph shows how the distance travelled by the ball changes with time.



(i) Determine the time taken for the ball to hit the ground.

(1)

.....

.....

(ii) Explain how the graph shows that the ball accelerates when it falls.

(3)

.....

.....

.....

.....

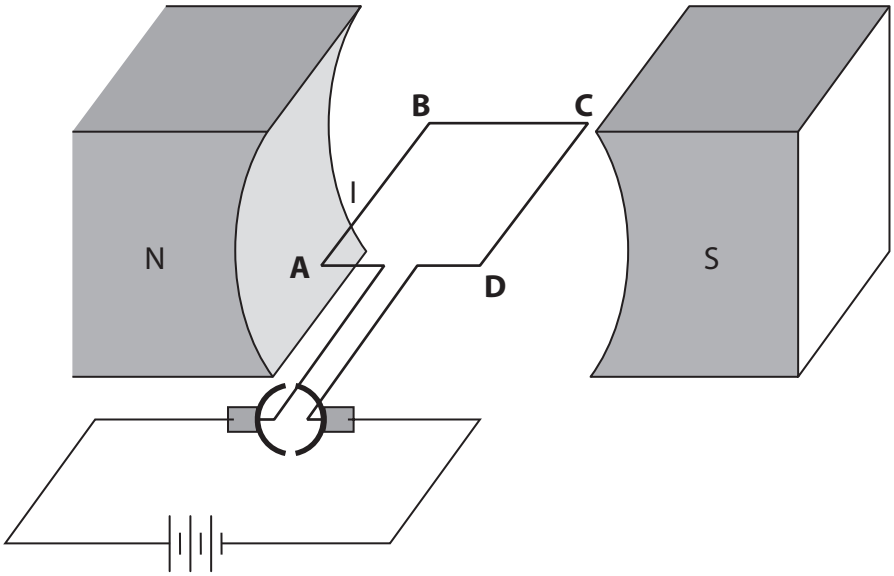
.....

.....

(Total for Question 3 = 7 marks)

4 The diagram shows part of an electric motor connected to a battery.

The coil is shown as **ABCD**.
The direction of the current, I, is from **A** to **B**.



(a) Draw an arrow showing the direction of the force on side **CD** of the coil.

(1)

(b) Give **one** change that can be made to the equipment that will make the motor spin in the opposite direction.

(1)

.....

.....

(c) Give **two** changes that can be made to the equipment that will make the motor spin slower.

(2)

1 .....

.....

2 .....

.....

(Total for Question 4 = 4 marks)

DO NOT WRITE IN THIS AREA

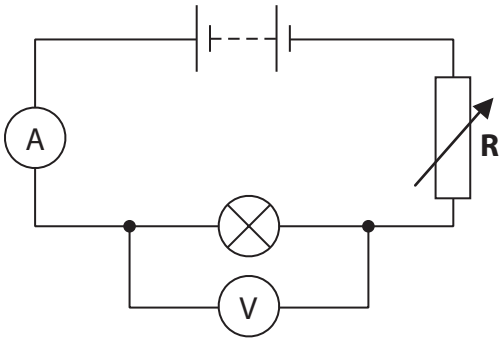
DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

BLANK PAGE

TURN OVER FOR QUESTION 5

5 A student investigates how the resistance of a lamp varies as the current is changed. She sets up the circuit shown.



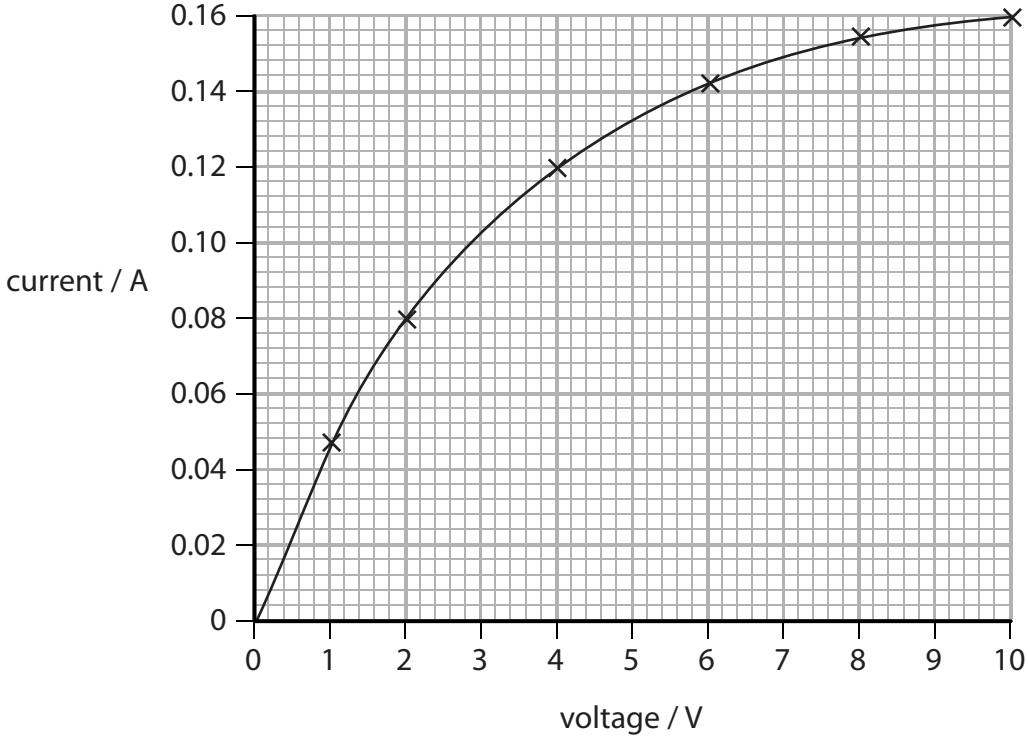
(a) Give a reason why component **R** is included in the circuit.

(1)

.....

.....

(b) The student draws a graph of his results.



(i) Describe how the current in the lamp changes as the voltage changes.
Use data from the graph to support your answer.

(3)

(ii) State the relationship between voltage, current and resistance.

(1)

(iii) Calculate the resistance of the lamp when the voltage is 2.5 V.

(3)

resistance = ... Ω

(c) State what happens to the resistance of a lamp when the current increases.

(1)

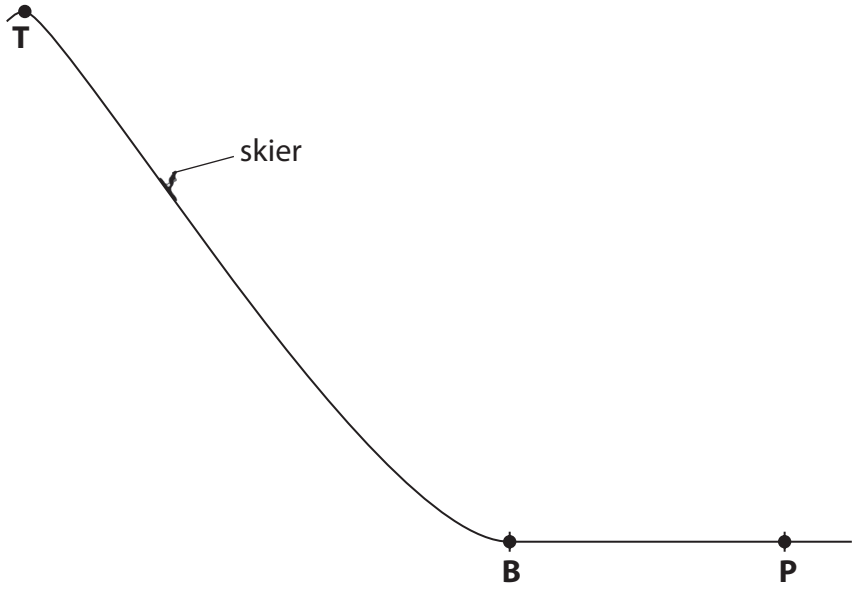
(Total for Question 5 = 9 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

6 The diagram shows a skier of weight 830 N skiing down a very steep slope.



The skier starts from rest at point **T**.

The force of gravity accelerates him down the slope.

(a) When he reaches point **B** his kinetic energy is 5.5×10^4 J.

State the gravitational potential energy of the skier at **T**.

You should assume there is no friction on the slope.

(1)

gravitational potential energy = ... J

(b) The skier stops at point **P** due to friction.

The distance from **B** to **P** is 73 m.

(i) State the relationship between work done, force and distance moved in the direction of the force.

(1)

.....

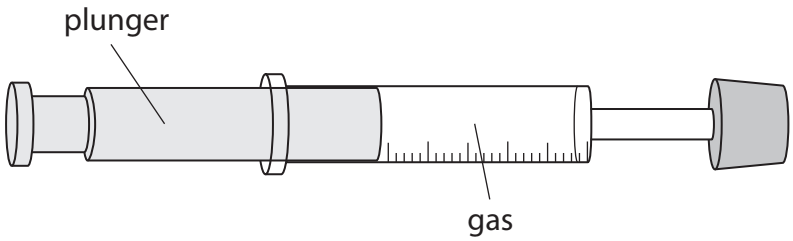
(ii) Calculate the mean frictional force as the skier moves from **B** to **P**.

(3)

mean force = ... N

(Total for Question 6 = 5 marks)

7 A gas is contained inside a sealed syringe.



(a) The plunger is pushed so that the gas is compressed and its volume reduces at constant temperature.

Explain why decreasing the volume changes the pressure of the gas in the syringe.

You should use ideas about particles in your answer.

(3)

(b) The plunger of the syringe is released and the gas returns to its original pressure of 100 kPa.

The plunger is then held in position so that the volume of the gas cannot change.

The gas is now heated and its temperature increases.

Describe how the average kinetic energy of the gas particles changes when the temperature of the gas increases.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 7 = 6 marks)

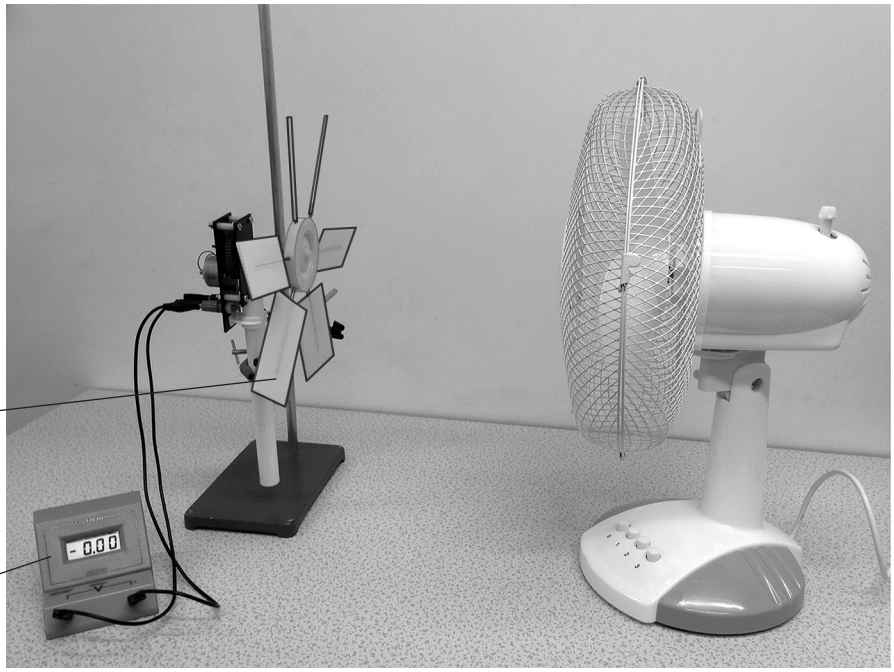
BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

8 A student investigates a wind turbine.
The student places an electric fan in front of the wind turbine.
The wind turbine is connected to a voltmeter.
When the wind turbine turns, it generates a voltage.



(a) The student decides to investigate how the angle of the blades of the wind turbine affects the voltage it generates.

State **two** control variables for this investigation.

(2)

1 .....

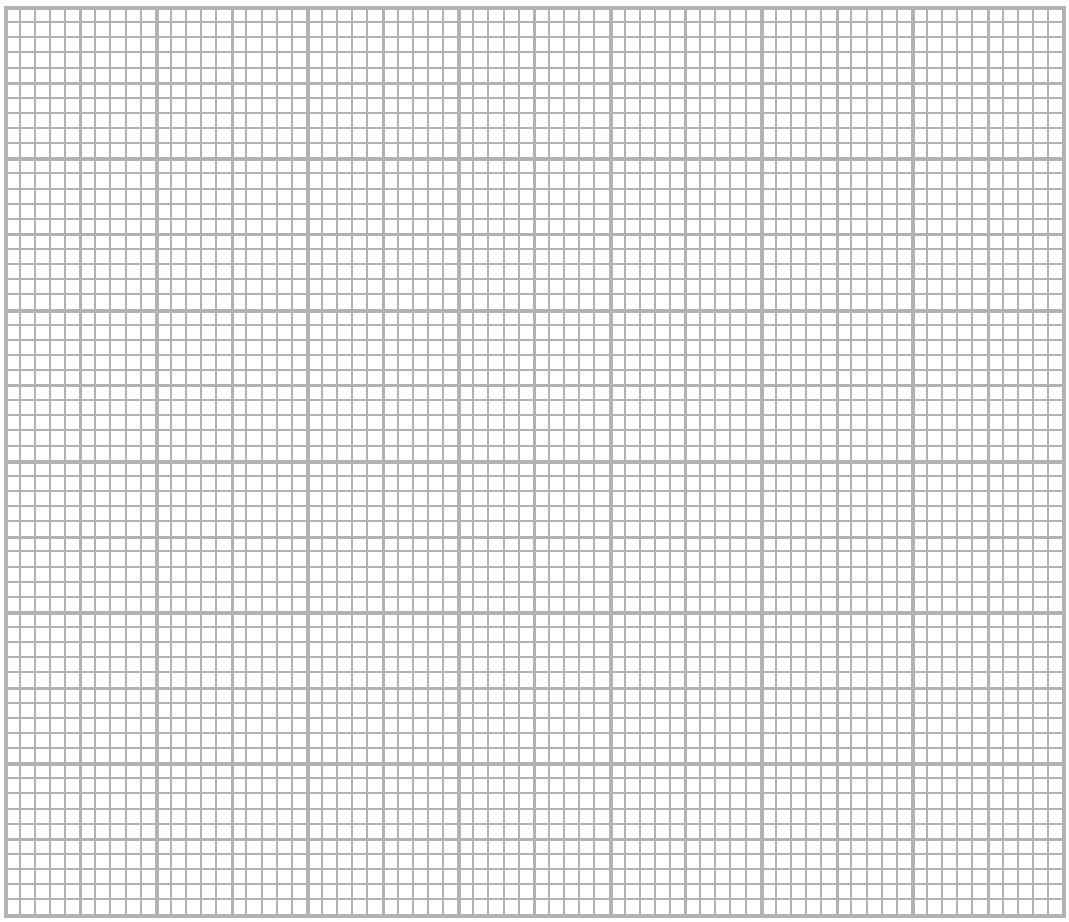
2 .....

(b) The student obtains the following results.

Blade angle / degree	Voltage / V
0	0.0
10	2.0
20	2.2
30	2.0
40	1.7
50	1.4
60	1.0
70	0.6
80	0.2
90	0.0

(i) Plot the student's results on the grid.

(3)



(ii) Draw a curve of best fit on the graph.

(2)

(iii) Describe the relationship between the blade angle and the voltage.

(2)

.....

.....

.....

.....

(Total for Question 8 = 9 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

9 In 2011, a nuclear accident happened at Fukushima in Japan.

This released radioactive materials into the environment.

A month later, the radioactivity of seaweed on the west coast of USA was tested.

The seaweed was found to contain radioactive iodine-131.

The half-life of iodine-131 is 8.0 days.

(a) Three samples of the same mass of seaweed were taken.
The number of counts in 10 minutes of the samples are shown in the table.

	sample 1	**sample 2**	**sample 3**
number of counts in 10 minutes	3970	3970	3985

Explain why three separate samples were used.

(2)

.....

.....

.....

.....

(b) Iodine-131 emits beta particles.
There was not a high risk to the public from the iodine-131 in the seaweed.

Explain **one** reason why the risk was not high.

(2)

.....

.....

.....

.....

(Total for Question 9 = 4 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

10 A light bulb used in homes converts electrical energy into light energy.

The input power of the light bulb is 52 W.

The efficiency of the light bulb is 5.0%.

Calculate the amount of light energy output by the lamp in 9.0 hours of use.

light energy output = ... J

(Total for Question 10 = 4 marks)

TOTAL FOR PAPER = 60 MARKS

BLANK PAGE

BLANK PAGE

BLANK PAGE

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Paper 3 (4SS0/1P)

Question number	Answer	Mark
1(a)	D	**1**

Question number	Answer	Mark
1(b)	B	**1**

Question number	Answer	Mark
1(c)	D	**1**

Question number	Answer	Mark
1(d)	C	**1**

Total for Question 1 = 4 marks

Question number	Answer	Additional guidance	Mark
2(a)(i)	wave speed = frequency × wavelength	equation can be given in words or symbols	**1**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	• Conversion of kHz to Hz OR cm to m • Substitution • Evaluation e.g. 2.9 kHz = 2900 Hz (1) (v =) 2900 x 0.12 (1) (v =) 350 (m/s) (1)	seen anywhere allow 348 (m/s) 0.348, 0.35, 34800, 35000 gains 2 marks 34.8, 35 gains 1 mark	**3**

Question number	Answer	Additional guidance	Mark
2(b)	A description that makes reference to any four of the following points: • long wavelength electromagnetic waves/radio waves cause little harm (1) • as wavelength increases, the harm/risk increases (1) • medium wavelength/ IR/microwaves only damage the surface layers/skin (1) • shorter wavelength/ultraviolet (UV) can cause damage to {cells lower down/skin cancer} (1) • very short wavelength /x-rays/gamma can cause damage {much deeper/mutation of cells/damage DNA} (1)	do not accept details of damage without reference to wavelength or region of electromagnetic spectrum allow correct specific details e.g. ultraviolet radiation causes sunburn	**4**

Total for Question 2 = 8 marks

Question number	Answer	Additional guidance	Mark
3(a)	• Downward arrow labelled 'weight' (1) • Upward arrow labelled 'reaction' (1) • Both arrows of approximately equal length and drawn in line with ball (1)	ignore 'gravity' allow 'gravitational force', 'force due to gravity' allow 'normal reaction force', 'normal contact force'	**3**

Question number	Answer	Additional guidance	Mark
3(b)(i)	0.51 (seconds)	allow value in range 0.50–0.52 (seconds)	**1**

Question number	Answer	Mark
3(b)(ii)	An explanation that makes reference to the following linked points: • gradient is equal to the {speed/velocity} of the ball (1) • gradient is increasing over time (1) • (therefore) the {speed/velocity} is increasing with time (1)	**3**

Total for Question 3 = 7 marks

Question number	Answer	Mark
4(a)	An arrow on the line CD pointing upwards	**1**

Question number	Answer	Mark
4(b)	Any one from the following: • reverse polarity of magnetic field/equivalent • reverse direction of current/equivalent	**1**

Question number	Answer	Mark
4(c)	Any two from the following: • decrease current/(battery) voltage/equivalent (1) • decrease strength of magnet/equivalent (1) • increase friction (in bearings) (1)	**2**

Total for Question 4 = 4 marks

Question number	Answer	Additional guidance	Mark
5(a)	In order to vary the current/voltage	allow because there is no variable voltage supply	**1**

Question number	Answer	Additional guidance	Mark
5(b)(i)	A description that makes reference to the following three points: • a simple pattern statement e.g. as the voltage increases the current increases (1) • a statement about linearity e.g. gradient decreases with voltage (1) • reference to data from the graph e.g. at 0 V the current in 0 A, but at 10 V, the current is 0.16 A (1)	allow alternative statements the increase is greater at low voltages	**3**

Question number	Answer	Additional guidance	Mark
5(b)(ii)	voltage = current × resistance	equation can be given in words or accepted symbols	**1**

Question number	Answer	Additional guidance	Mark
5(b)(iii)	• Rearrangement • Substitution • Evaluation e.g. R = V/I (1) = 2.5/0.92 (1) 2.7 (Ω) (1)	seen anywhere allow a range of ±0.02 A for the reading of current from graph max two marks if current incorrect	**3**

Question number	Answer	Mark
5(c)	Increases/equivalent	**1**

Total for Question 5 = 9 marks

Question number	Answer	Mark
6(a)	5.5×10^4 J	**1**

Question number	Answer	Additional guidance	Mark
6(b)(i)	work done = force × distance moved in the direction of the force	equation can be given in words or symbols	**1**

Question number	Answer	Additional guidance	Mark
6(b)(ii)	• Rearrangement (1) • Substitution (1) • Evaluation (1) e.g. F= W/d = $(5.5 \times 10^4) \div 73$ = 750 (N)	seen anywhere accept 753.4(…..)	**3**

Total for Question 6 = 5 marks

Question number	Answer	Additional guidance	Mark
7(a)	An explanation that makes reference to the following linked points: • particles collide with walls (of container) (1) and any two from: • more frequently/time between collisions is less (1) • (resulting in) larger force (1) • (over a) smaller surface area (1)	 allow 'more often'	 **3**

Question number	Answer	Additional guidance	Mark
7(b)	A description that makes reference to the following three points: • (average kinetic energy) increases (1) • in (direct) proportion to (1) • Kelvin temperature (1)	 dependent on point 1 dependent on point 1	 **3**

Total for Question 7 = 6 marks

Question number	Answer	Additional guidance	Mark
8(a)	Any two control variables from the following: • distance between fan and turbine (1) • fan speed (1) • number of turbine blades (1) • turbine angle (1) • fan angle (1) • orientation of fan with respect to turbine (1)	ignore type of fan/turbine	**2**

Question number	Answer	Additional guidance	Mark
8(b)(i)	Scale (1) Axes (1) Plotting (1)	both axes should occupy at least 50% of the grid both axes should be labelled with quantity and unit orientation unimportant points should be accurate within 1mm. −1 mark for each error	**3**

Question number	Answer	Additional guidance	Mark
8(b)(ii)	• Curve starting at (0,0) (1) • Smooth curve to a peak at (20, 2.2) (1)	curve should be smooth with roughly equal distribution of points either side	**2**

Question number	Answer	Additional guidance	Mark
8(b)(iii)	A description that makes reference to the following two points: • voltage increases, then decreases as blade angle is increased (1) • maximum voltage when blade angle is 20° (1) • non-linear relationship (1)	allow range of 15°−25°	**2**

Total for Question 8 = 9 marks

Question number	Answer	Additional guidance	Mark
9(a)	An explanation that makes reference to the following linked points: • need to be able to find the mean value of the data (1) • but cannot do these consecutively as the sample will have decayed and hence following readings will be lower/so that you can check the reliability (1)	accept reference to I-131 having a short half life	**2**

Question number	Answer	Mark
9(b)	An explanation that makes reference to two of the following linked points: • short half-life (1) therefore radioactivity will decrease rapidly (1) OR • (beta particles) do not have a long range (in air) (1) therefore do not enter the body (1)	**2**

Total for Question 9 = 4 marks

Question number	Answer	Additional guidance	Mark
10	• Conversion of hours to seconds • Evaluation of output power • Rearrangement and substitution into P=W/t • Evaluation of light energy output e.g. 9 hours = 32 400 seconds (1) Output power = 2.6 (W) (1) (light energy output =) 2.6 x 32 400 (1) (light energy output =) 84 000 (J) (1)	allow 32 400 seen anywhere allow 84 240 (J) 23.4 (J) gains 3 marks (not changing time to seconds) 1 684 800 (J) gains 3 marks (not factoring in efficiency) 468 (J) gains 2 marks (not changing time to seconds and not factoring in efficiency) in the absence of any other marks, allow efficiency equation stated for 1 mark	**4**

Total for Question 10 = 4 marks

TOTAL FOR PAPER = 60 MARKS

For information about Edexcel, BTEC or LCCI qualifications
visit qualifications.pearson.com

Pearson Education Limited. Registered in England and Wales No. 872828
Registered Office: 80 Strand, London WC2R 0RL
VAT Reg No GB 278 537121

Getty Images: Alex Belmonlinsky

ISBN 978-1-4469-3431-9