

Monday 20 June 2022 – Morning

**GCSE (9–1) Combined Science (Chemistry) A
(Gateway Science)**

J250/10 Paper 10 (Higher Tier)

Time allowed: 1 hour 10 minutes



You must have:

- a ruler (cm/mm)
- the Data Sheet for GCSE (9–1) Combined Science (Chemistry) A (inside this document)

You can use:

- a scientific or graphical calculator
- an HB pencil



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **24** pages.

ADVICE

- Read each question carefully before you start your answer.

15 For many years it was thought that the Group 0 elements were completely unreactive.

However, more recently, scientists have been able to react some of the Group 0 elements with fluorine.

The table shows information about some of the compounds Group 0 elements make with fluorine.

Group 0 element	Year compound first made	Formula of compound
Helium	no compounds yet made	
Neon	no compounds yet made	
Argon	2003	ArF_2
Krypton	1963	KrF_2
Xenon	1962	XeF_2

(a) Give a reason why the Group 0 elements are usually described as unreactive.

.....
 [1]

(b) Give a reason why scientists have used **fluorine** to make compounds of the Group 0 elements.

.....
 [1]

(c) Xenon difluoride, XeF_2 , is a solid at room temperature. It melts at 129°C and boils at 155°C . It does **not** conduct electricity in any state.

(i) Suggest the structure of xenon difluoride, XeF_2 .

..... [1]

(ii) Give **two** reasons for your answer in (c)(i).

1

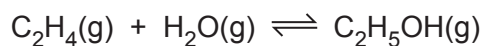
2

[2]

(d) Describe how the trend in reactivity of the Group 0 elements is linked to the size of the atoms.

.....
 [1]

16 Ethanol, C₂H₅OH, can be made by reacting ethene, C₂H₄, with steam, H₂O.



The forward reaction is exothermic.

(a) State Le Chatelier's principle.

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

(b) As the temperature of the reaction is **increased** does the amount of ethanol decrease, increase or stay the same?

..... [1]

(c) Explain your answer to (b).

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

(d) As the pressure of the reaction is **increased** does the amount of ethanol decrease, increase or stay the same?

..... [1]

(e) Explain your answer to (d).

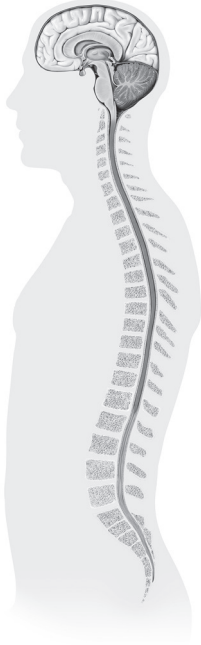
.....
.....
.....
..... [2]

END OF QUESTION PAPER

SECTION B

Answer **all** the questions.

11 The diagram shows the central nervous system (CNS).



(a) Complete the sentence to describe the structure of the CNS. Use the diagram.

The CNS is made up of the and the cord.

[2]

(b) Hot objects can burn your skin. Removing your hand from a hot object is a reflex action. The response is a reflex action because it is controlled by a reflex arc.

(i) Suggest two **other** reasons why the response is a reflex action.

1

2

[2]

(ii) Draw lines to connect each **part** of the reflex arc to its correct **function** when responding to a hot object.

Part	Function
muscles	detects the hot object
motor neurone	move the hand away
receptor in skin	carries electrical impulses to the CNS
sensory neurone	carries electrical impulses to the muscles

[3]

(c) A student uses a computer program to measure the reaction times of their friends.

The table shows their results.

Friend	Sex of friend	Age of friend	Time spent each week playing computer games (hours)	Reaction time (s)
A	male	14	5	0.34
B	male	14	7	0.29
C	female	15	6	0.26
D	female	14	15	0.24
E	male	15	3	0.27

(i) Identify the **median** reaction time for the five friends.

Median reaction time = s [1]

(ii) Calculate the **mean** reaction time for the five friends.

Mean reaction time = s [2]

(iii) Use the data in the table to suggest **one** reason why friend **D** has the fastest reaction time.

.....
 [1]

12 HIV and TB (tuberculosis) are infectious diseases.

(a) HIV is spread between humans during sexual intercourse when body fluids come into contact.

TB is a disease caused by bacteria. It affects the lungs.

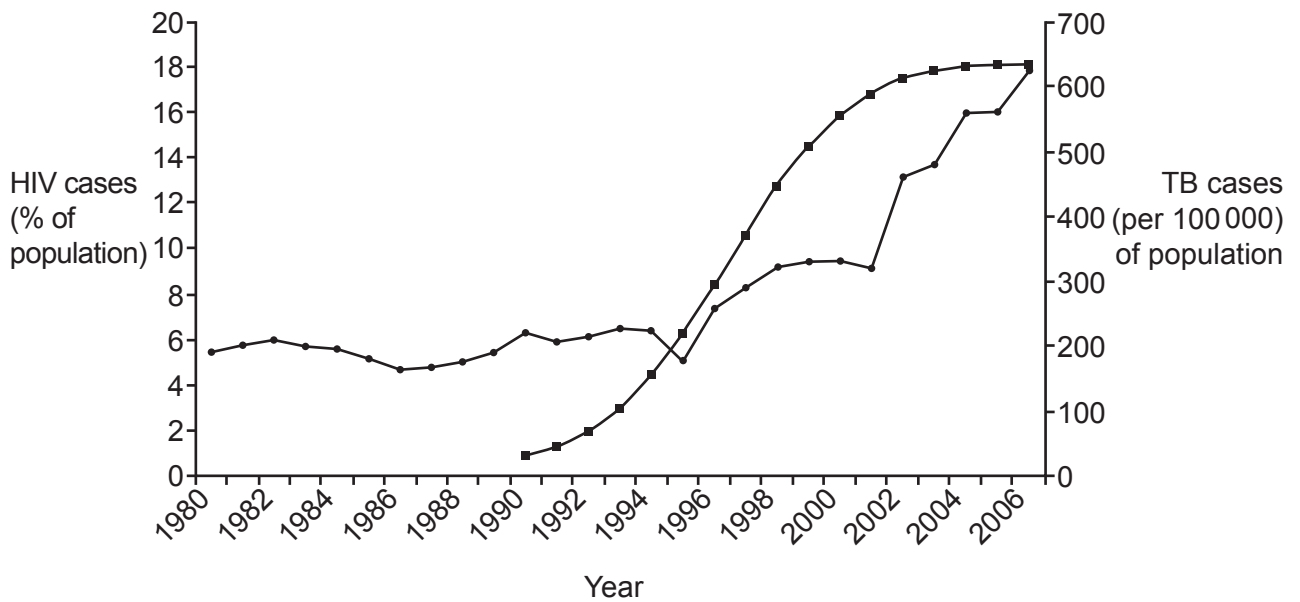
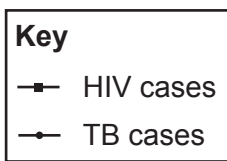
(i) Explain how TB is spread between humans.

.....

.....

..... [2]

(ii) The graph shows how the number of cases for HIV and TB have changed between 1980 and 2006 for one country.



Describe how the graph shows a link between HIV and TB.

.....

.....

..... [2]

(iii) Describe how the **lungs** defend the body against infection from TB bacteria.

.....

.....

..... [2]

(b) The lungs can also be affected by cancer.

Complete these sentences to describe what cancer is.

Use the words in the list.

differentiated	meiosis	mitosis	multiple	undifferentiated
-----------------------	----------------	----------------	-----------------	-------------------------

Cancer is the result of uncontrolled growth when cells divide by

This may lead to millions of cells that are unable to become specialised.

[2]



Oxford Cambridge and RSA

Monday 20 June 2022 – Afternoon

GCSE (9–1) Food Preparation and Nutrition

J309/01 Food preparation and nutrition

Time allowed: 1 hour 30 minutes

No extra materials are needed.



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **12** pages.

ADVICE

- Read each question carefully before you start your answer.

4

(a) Identify **two** foods which are often protected using controlled atmosphere packaging (CAP).

1

2

[2]

(b) Describe how food should be stored in a refrigerator.

.....

.....

.....

.....

.....

..... [4]

5

(a) State **two** conditions required for yeast to grow.

1

2

[2]

(b) Identify **one** sign of food spoilage.

..... [1]

(c) Explain **two** ways food poisoning can be prevented when preparing food.

1

.....

.....

2

.....

.....

[4]

6 To make successful choux pastry the recipe instructions should be followed carefully.

(a) Identify **one** reason for each of the following instructions.

(i) Measure the ingredients accurately.

..... [1]

(ii) Sieve the flour.

..... [1]

(iii) Allow the mixture to cool before adding the eggs.

..... [1]

(iv) Bake in a hot oven.

..... [1]

(b) Name the raising agent used in choux pastry.

..... [1]

(c) State **two** qualities of successful choux pastry.

1

2

[2]



Oxford Cambridge and RSA

Monday 23 May 2022 – Morning

GCSE (9–1) Geography A (Geographical Themes)

J383/01 Living in the UK Today

Time allowed: 1 hour



You must have:

- the Resource Booklet (inside this document)

You can use:

- a ruler (cm/mm)
- a scientific or graphical calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- Spelling, punctuation and grammar (SPaG) and the use of specialist terminology will be assessed in questions marked with a pencil (✎).
- This document has **12** pages.

ADVICE

- Read each question carefully before you start your answer.

Answer **all** the questions.

Landscapes of the UK

1

(a) Which of the following terms is defined below?

'Large pebbles and boulders are rolled along the beach.'

- A Saltation
- B Solution
- C Suspension
- D Traction

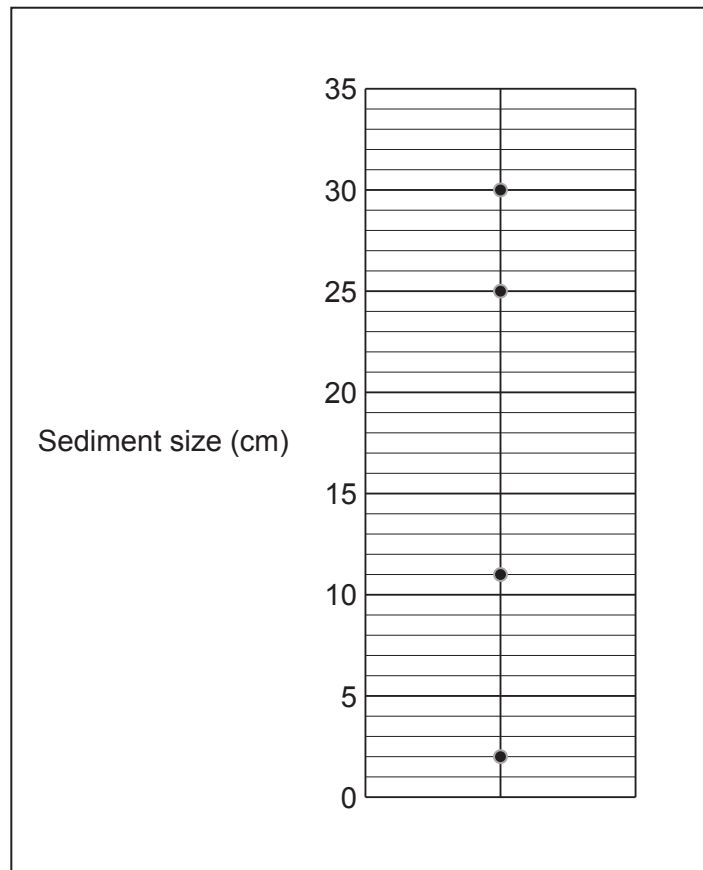
Write the correct letter in the box.

[1]

(b) Study the dispersion graph below. It shows the variation in sediment size on a beach.

(i) Complete the graph using the data:

Sediment size (cm)
5



[1]



Oxford Cambridge and RSA

Wednesday 22 June 2022 – Morning

GCSE (9–1) Music

J536/05 Listening and Appraising

Time Allowed: up to 1 hour 30 minutes

The time allowed for the examination is the duration of the CD.



You can use:

- an HB pencil



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

Candidate number

First name(s) _____

Last name _____

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for writing on the score.
- After the CD has started, you will have **2 minutes** to read through this question paper.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **80**.
- The marks for each question are shown in brackets [].
- You will have time to write your answers between the playing of extracts.
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **20** pages.

ADVICE

- Listen to and read each question carefully before you start your answer.



Oxford Cambridge and RSA

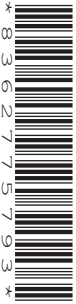
Tuesday 24 May 2022 – Afternoon

GCSE (9–1) Physical Education

J587/01 Physical factors affecting performance

Time allowed: 1 hour

No extra materials are needed.



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE

- Read each question carefully before you start your answer.

Section A

Answer **all** the questions.

1 Other than sprinting, give an example of an athletic event that is anaerobic.

..... [1]

2

(a) Name the fitness component that is measured using the 'wall throw' test.

..... [1]

(b) Describe a practical example to show the importance of this fitness component in a sport of your choice.

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

3 A weightlifter who performs one repetition of a 50 kg bench press uses muscular endurance.

Is this statement true or false? Draw a circle around your answer.

True

False

[1]

4

- (a) Using Fig. 1, draw a line through the centre of the body that represents the transverse axis of rotation.

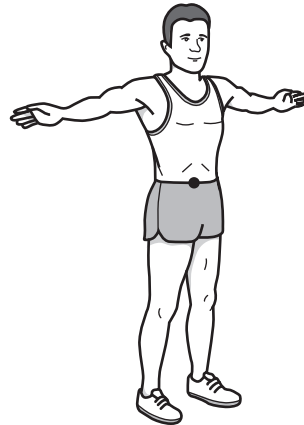


Fig. 1

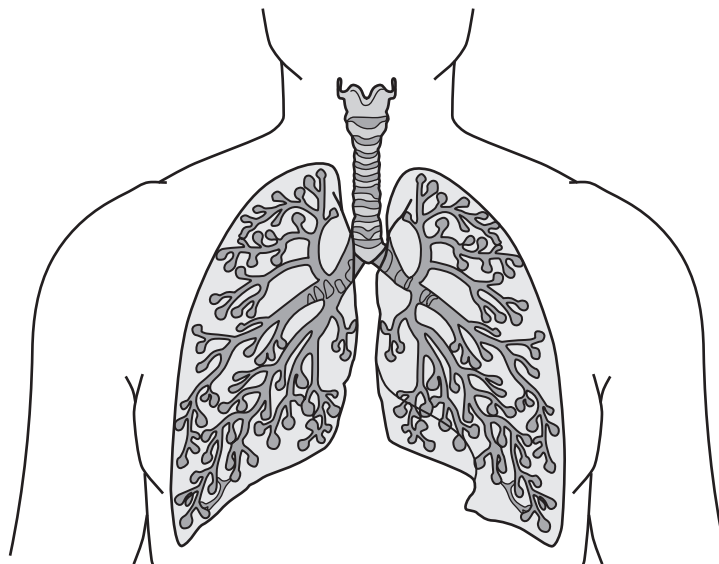
[1]

- (b) Give a practical example from physical activity or sport where movement takes place around the transverse axis of rotation.

..... [1]

5 Fig. 2 shows a diagram of the lungs.

Fig. 2



- (a) Draw on Fig. 2 to indicate the position of the diaphragm during inhalation. [1]

- (b) Describe the role of the diaphragm during exhalation.

..... [1]



Oxford Cambridge and RSA

Monday 16 May 2022 – Afternoon

**AS Level in Design and Technology:
Design Engineering**

H004/01 Principles of Design Engineering

Time allowed: 1 hour 45 minutes



You can use:

- a ruler (cm/mm)
- a scientific calculator
- geometrical instruments



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

Candidate number

First name(s) _____

Last name _____

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION

- The total mark for this paper is **90**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **20** pages.

ADVICE

- Read each question carefully before you start your answer.

(d) The outer clear casing of the electric hole punching machine shown in **Fig. 1.1** is made from a thermoplastic material.

(i) Name a suitable thermoplastic material for the outer clear casing.

..... [1]

(ii) State **two** properties of the thermoplastic material you have identified in **part (d)(i)** that make it suitable for the outer clear casing.

Justify **each** of your answers.

1

.....

.....

.....

2

.....

.....

.....

[4]

(iii) Name a suitable manufacturing method for the outer clear casing.

..... [1]

(iv) State **two** reasons why the manufacturing method you have identified in **part (d)(iii)** is suitable for manufacturing the outer clear casing.

Justify **each** of your answers.

1

.....

.....

.....

2

.....

.....

.....

[4]

Thursday 9 June 2022 – Afternoon

A Level Biology A

H420/01 Biological processes

Time allowed: 2 hours 15 minutes



You must have:

- the Insert (inside this document)

You can use:

- a ruler (cm/mm)
- a scientific or graphical calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

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- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **32** pages.

ADVICE

- Read each question carefully before you start your answer.

18 A student investigated osmosis in plant cells.

They used cylinders of potato cut with a cork borer and measured the change in length of the cylinders after they were placed in sucrose solutions and left overnight.

(a) The student was given 100 cm^3 of a solution of 1 mol dm^{-3} sucrose and asked to prepare 30 cm^3 of each dilution.

(i) Complete **Table 18.1** to show how the student should prepare the solutions.

Table 18.1

Final concentration of solution (mol dm^{-3})	Volume of 1 mol dm^{-3} sucrose solution (cm^3)	Volume of distilled water (cm^3)	Final volume (cm^3)
1.0			30.0
0.8			30.0
0.6			30.0
0.4			30.0
0.2			30.0
0.0			30.0

[3]

(ii) The solution given to the student was prepared using 34.23 g of sucrose in 100 cm^3 water.

The sucrose was measured on an electronic balance using the following procedure:

- mass of weighing boat empty = 10.55 g
- mass of weighing boat plus sucrose = 44.78 g.

The balance recorded masses to two decimal places with an uncertainty of $\pm 0.01\text{ g}$.

Calculate the percentage uncertainty in the mass of sucrose.

Uncertainty = % [2]

(b) The student's results are shown in Table 18.2.

Table 18.2

Concentration of sucrose (mol dm^{-3})	Length of potato cylinder (mm)			Percentage change in length (%)	Mean percentage change in length (%)
	initial	final	change		
1.0	49.5	48.0	-1.50	-3.0%	-3.4%
	50.5	49.0	-1.50	-3.0%	
	49.0	47.0	-2.00	-4.1%	
0.8	49.0	48.0	-1.00	-2.0%	-2.6%
	50.5	49.5	-1.00	-2.0%	
	51.0	49.0	-2.00	-3.9%	
0.6	50.0	50.5	0.50	1.0%	0.3%
	51.0	51.0	0.00	0.0%	
	50.5	50.5	0.00	0.0%	
0.4	50.5	51.5	1.00	2.0%	0.7%
	49.5	51.0	1.50	3.0%	
	51.0	49.5	-1.50	-2.9%	
0.2	50.0	52.0	2.00	4.0%	4.3%
	50.5	52.5	2.00	4.0%	
	49.5	52.0	2.50	5.1%	
0.0	49.5	52.0	2.50	5.1%	4.4%
	49.0	51.0	2.00	4.1%	
	50.0	52.0	2.00	4.0%	

The student was told that one of their results was anomalous.

(i) Identify the anomalous result.

..... [1]

(ii) State **one** variable that should be controlled in this experiment and give a reason for your choice.

Control variable

Reason

.....

..... [2]

Monday 20 June 2022 – Morning

A Level Chemistry A

H432/02 Synthesis and analytical techniques

Time allowed: 2 hours 15 minutes

You must have:

- the Data Sheet for Chemistry A

You can use:

- a scientific or graphical calculator
- an HB pencil



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INFORMATION

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- This document has **32** pages.

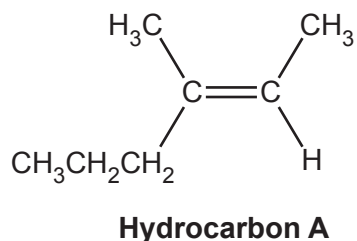
ADVICE

- Read each question carefully before you start your answer.

10
SECTION B

16 This question is about unsaturated hydrocarbons.

(a) The unsaturated hydrocarbon **A**, shown below, is reacted with bromine.



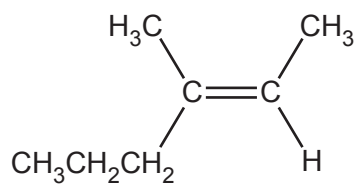
(i) What is the systematic name of hydrocarbon **A**?

..... [1]

(ii) Outline the mechanism for the reaction of hydrocarbon **A** with bromine.

The structure of hydrocarbon **A** has been provided.

Include curly arrows and relevant dipoles.



[3]

(b) Compounds **B** and **C** are **branched** hydrocarbons that are structural isomers of C_6H_{12} .

Compounds **B** and **C** both have stereoisomers.

- Compound **B** has *cis* and *trans* isomers but does **not** have optical isomers.
- Compound **C** has optical isomers but does **not** have *cis* and *trans* isomers.

(i) What is meant by the term **structural isomers**?

.....

.....

..... [1]

(ii) What is meant by the term **stereoisomers**?

.....

.....

..... [1]

(iii) Draw structures for the *cis* and *trans* isomers of the branched hydrocarbon **B**.

<i>cis</i> isomer	<i>trans</i> isomer

[2]

(iv) Draw 3D structures for the optical isomers of compound **C**.

Optical isomers	

[2]

Answer **either** Section A or Section B.

Section A: Comprehension and Grammar

Read the passage below carefully and answer the questions which follow.

Pliny, as governor of the province of Bithynia, writes to the emperor Trajan to obtain his approval for the construction of a bath-house in the city of Prusa.

mihi nuper quaerenti, domine, Prusae ubi posset balineum aedificari, placuit locus in quo fuit aliquando domus, ut audio, pulchra, nunc deformis ruinis. per hoc enim efficiemus ut foedissima facies urbis renovetur atque etiam ut ipsa civitas amplietur, nec ulla aedificia tollantur, sed quae vetustate sublapsa sunt restituantur in melius.

est autem huius domus condicio talis: tradiderat eam in testamento Polyaeus Claudio Caesari iussitque in peristylio templum ei fieri, reliqua ex domo locari. ex ea reditum diu civitas accepit; sed paulatim spoliata, deinde peristylio collapso domus tota neglecta est, ac iam paene nihil ex ea nisi situs superest. quem si tu, domine, civibus donaveris, propter opportunitatem loci pro summo munere accipient. ego, si permiseris, cogito in area vacua balineum collocare, eum autem locum in quo aedificia fuerunt porticibus amplecti atque tibi consecrare, cuius beneficio elegans opus dignumque nomine tuo fiet.

exemplar testamenti misi tibi; ex quo cognosces Polyaeum multas res ad eandem domum ornandam reliquisse quae, ut domus ipsa, perierunt: a me tamen in quantum potuerit repetentur.

Pliny, *Letters* 10.70 (adapted)

Names

<i>Prusa, -ae</i> (f)	Prusa (a city in the province of Bithynia)
<i>Polyaeus, -i</i> (m)	Polyaeus
<i>Claudius Caesar, Claudii Caesaris</i> (m)	the emperor Claudius

Words

<i>balineum, -i</i> (n)	bath-house
<i>peristylium, -i</i> (n)	forecourt
<i>loco, locare</i>	I lease, rent out
<i>reditus, -us</i> (m)	income
<i>exemplar, -is</i> (n)	copy

- 1 *mihi ... ruinis* (lines 1–2):
- (a) what has Pliny been doing recently? [1]
- (b) what does he say about the result of his efforts? [3]
- 2 *per hoc ... melius* (lines 2–4): what will be the advantages of Pliny's plan? [5]
- 3 *est autem ... superest* (lines 5–8): describe how this property came to be in its present condition. [7]
- 4 *quem si tu ... tuo fiet* (lines 8–12): how does Pliny try to involve Trajan in his project? [9]
- 5 Translate *exemplar ... repetentur* (lines 13–15).
Please write your translation on alternate lines. [10]
- 6 State and explain the case of the following, using a translation if you think it is helpful:
- (a) *quaerenti* (line 1) [2]
- (b) *huius* (line 5) [2]
- (c) *ei* (line 6) [2]
- (d) *beneficio* (line 11) [2]
- 7 Which part of the verb are the following:
- (a) *efficiemus* (line 3)? [1]
- (b) *fieri* (line 6)? [1]
- (c) *donaveris* (line 9)? [1]
- 8 Give the present active infinitive of the following:
- (a) *accepit* (line 7) [1]
- (b) *reliquisse* (line 14) [1]
- 9 Explain why the following verbs need to be subjunctive, using a translation if you think it is helpful:
- (a) *posset* (line 1) [1]
- (b) *renovetur* (line 3) [1]

[Total: 50 marks]



Oxford Cambridge and RSA

Monday 13 June 2022 – Afternoon

A Level Computer Science

H446/01 Computer Systems

Time allowed: 2 hours 30 minutes



You can use:

- an HB pencil

Do not use:

- a calculator



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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Last name

INSTRUCTIONS

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- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **140**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **32** pages.

ADVICE

- Read each question carefully before you start your answer.

- (e) The programmer creates another function to count and return how many capital letters are in a string that is passed into the function as a parameter.

The `asc()` function takes in a character and returns its ASCII value. For example `asc("A")` returns 65. Capital letters have ASCII values between 65 and 90 inclusive.

- (i) Complete the function below.

```
function countCapitals(text)
    // initialise counter to 0
    capCount = 0
    // loop through each character in the string passed in
    for x = 0 to text.length-1
        c = text.subString(x, 1)
        // check if character is a capital
        if asc(c) >= 65 .....
            // if so, increment counter
            .....
        endif
    next x
    .....
endfunction
```

[3]

- (ii) Give **one** similarity between ASCII and Unicode.

.....
 [1]

- (iii) Give **two** differences between ASCII and Unicode.

Difference 1

 Difference 2

[2]

EXTRA ANSWER SPACE

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