Haywards Heath College

GETTING READY FOR PACK

OCR Advanced National AAQ in Applied Science

We are delighted you have chosen to study Applied Science at Haywards Heath College

WHAT YOU WILL STUDY	
First Year	**Unit 1 Science Fundamentals** – Covers elements of Biology, Chemistry, and Physics, within Biology DNA replication, Cellular Biology. Chemistry- Functional groups (organic chemistry), Types of reactions, and rates of reactions. Physics- radiation, forces and energy, and more. Assessed via Exam. **Unit 2 Investigating science** - A research project. You design, research, carry out and reflect upon your own project. Assessed as coursework.
Second Year	**Science in society –** An exam on the impact that science has on the wider community and how this is achieved. **Analytical techniques in chemistry –** Qualitative and quantitative analysis, separation, spectroscopic techniques. You will study theory and carry out practical analysis to provide data for your coursework. **Medical Physics –** Imaging, ultrasound, radiotherapy, half life, planning for diagnosis and therapy will be covered in preparation for a written piece of work.

WHAT YOU NEED	
Kit List	Lab coats, safety specs and laboratory equipment will be provided
Equipment	Equipment: Ring binder with dividers, scientific calculator, and basic stationery
Essential Textbooks	Course Companions for Mandatory Units F180-F182. Cambridge Advanced Nationals Applied Science (AAQ) to be released July 2025 Course Companions for Mandatory Units F180-F182. Cambridge Advanced Nationals Applied Science (AAQ)

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ENRICHMENT	
Trips	Trips: Visits to local science centres, university labs, and industry partners to see science in action.
Guest Speakers	Guest Speakers: Talks from professionals in biomedical science, environmental science, and chemical engineering.
Events	Events: STEM workshops, STEM Academy and science fairs to explore careers and innovations in science. International Chemistry, Biology and Physics Olympiad opportunities

RECOMMENDED READING/WATCH LIST
Summer Reading/Watchlist Optional Tasks
• "The Science Book" by DK – a visual guide to scientific breakthroughs. • "Stuff Matters" by Mark Miodownik – explores the science behind everyday materials. • Watch: BBC's "The Secret Life of the Laboratory" (YouTube or iPlayer)

SUMMER WORKING TASK INFORMATION
Completion Date: First Lesson Week Commencing 8/9/25
This pack will help you make the best possible start to studying this subject. The tasks in this pack should take you about 4-6 hours to complete. The tasks are designed to get a bit more difficult as you work through them as they are preparing you for studying at a higher level and to become an effective independent learner. You should try to get as far as you can working on your own but if you do need help, please email us at **info@haywardsheath.ac.uk** telling us which Getting Ready For pack you are working on and what help you need.

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SUMMER WORKING TASK	
Skills Focus	Maths skills: Converting to SI units Calculating sizes of atoms Balancing chemical symbol equations Working out formula of ionic compounds GCSE science knowledge, including: Periodic table Atomic structure Structure types Chemical symbol equations
Complete the workbook covering all the following tasks:	
Task 1	**Worksheet 1: The Periodic Table** An understanding of the Periodic Table is important for any science course. This worksheet reviews what you should have learnt in GCSE Science. If you need help completing this activity, GCSE bitesize revision is helpful: https://www.bbc.com/bitesize/topics/zxnftv4
Task 2	**Worksheet 2 and 3: Atoms, ions and electron arrangement** This activity reviews atomic structure and ions. You will need a scientific calculator for this activity – this is an essential requirement for this course. For help in converting pm (picometres) to metres, click on this link https://physics.nist.gov/cuu/Units/prefixes.html
Task 3	**Worksheet 4: Structure types** You should have covered the different types of substances – metallic, ionic, simple covalent, giant covalent and monatomic in GCSE Science. These are some bbc bitesize notes to help you answer the questions: https://www.bbc.com/bitesize/guides/zjfkw6f/revision/1
Task 4	**Worksheet 5: Writing chemical formula** Understanding how to write chemical formula is vital for success in chemistry. You may find this video helpful: https://www.youtube.com/watch?v=URc75hoKGLY
Task 5	**Worksheet 6: Science in the News** Find a recent science-related news article (from BBC Science, New Scientist, or similar). - Summarise the article in your own words. - Identify which branch of science it relates to (biology, chemistry, or physics). - Explain why this topic is important to society.
Task 6	**Worksheet 7: Lab Safety Poster** Design a poster (digital or hand-drawn) showing 10 key lab safety rules. - Include symbols for hazards (e.g., corrosive, flammable). - Explain why each rule is important.

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Worksheet 1: The Periodic Table

GCSE QUICK CHECK

THE PERIODIC TABLE

1 a In what order are the elements arranged in the Periodic Table? .....

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b How many electrons are in the outer shell of atoms of the following elements?

aluminium ..... fluorine ..... silicon .....

c Give the group and period number of the element with electron structure 2,8,5.

group ..... period.....

d Which group are the following elements in? The electron structure of these elements is given.

2,8,8,1 ..... 2,6 ..... 2,8,18,5 .....

2 a Explain why elements that are in the same group in the Periodic Table have similar properties.

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b Explain why the elements in Group 0 are unreactive.

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c Explain why the elements in Group 1 are very reactive.

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Worksheet 2: Atoms and ions

GCSE REVISION

Atoms, ions, equations, Periodic Table

1 a) Complete the following table about protons, neutrons and electrons.

	neutron	proton	electron
relative charge			
relative mass			

b) Define the term **mass number**. .....

.....

c) Define the term **atomic number**. .....

.....

2 Complete the following table about some atoms and ions. The first row has been done for you.

Particle	Atom or ion	Atomic number	Mass number	Number of protons	Number of neutrons	Number of electrons	Electron structure
$^{19}_{9}F^-$	ion	9	19	9	10	10	2,8
$^{40}_{18}Ar$							
$^{27}_{13}Al^{3+}$							
				16	18	18	
				19	20	18	
				15	16	15	

3 The diameter of an indium atom is 310 pm.

a) What is the diameter of an indium atom in metres? Give your answer in standard form.

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b) How many indium atoms would fit in a line 20 cm long? Give your answer to 3 significant figures.

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4 This question is about the Periodic Table

a) Name each of the following groups.

Group 1 .....

Group 7 .....

Group 0 .....

b) Which group would the following elements be in?

element with electron structure 2,8,6 .....

element with electron structure 2,8,8 .....

element with electron structure 2,8,18,3 .....

5 Balance each of the following equations.

a) $K + O_2 \rightarrow K_2O$

b) $CaCO_3 + HCl \rightarrow CaCl_2 + H_2O + CO_2$

c) $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$

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Worksheet 3: Electron arrangement

Group 1	Group 2		Group 3	Group 4	Group 5	Group 6	Group 7	Group 0
		hydrogen H Atomic number = 1  structure = ...						helium He Atomic number = 2  structure = ...
lithium Li Atomic number = 3  structure = 2,1	beryllium Be Atomic number = ...  structure = ...		boron B Atomic number = ...  structure = ...	carbon C Atomic number = ...  structure = ...	nitrogen N Atomic number = ...  structure = ...	oxygen O Atomic number = ...  structure = ...	fluorine F Atomic number = ...  structure = ...	neon Ne Atomic number = ...  structure = ...
sodium Na Atomic number = ...  structure = ...	magnesium Mg Atomic number = ...  structure = ...		aluminium Al Atomic number = ...  structure = ...	silicon Si Atomic number = ...  structure = ...	phosphorus P Atomic number = ...  structure = ...	sulfur S Atomic number = ...  structure = ...	chlorine Cl Atomic number = ...  structure = ...	argon Ar Atomic number = ...  structure = ...
potassium K Atomic number = ...  structure = ...	calcium Ca Atomic number = ...  structure = ...							

1) The first 20 elements in the Periodic Table are shown below. The elements are arranged in order of increasing atomic number. Fill in the atomic number for each element. The first three have been done for you.

2) Complete the boxes to show the electronic structure of the first 20 elements. The box for lithium has been done for you.

3) What is the link between the Group number and the electronic structure? .....

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Worksheet 4: Structure types

STRUCTURE TYPES

1) Which type of structure do the following substances have?

	K_2O	K	O_2	CH_2O	Ar	S_8	Br_2	Cr	FeI_3	$MgSO_4$	N_2H_4
ionic											
simple molecular											
metallic											
monatomic											
giant covalent											

2) Look at the properties of the following substances.

Substance	Melting point (°C)	Boiling point (°C)	Electrical conductivity as	
			solid	liquid
A	587	843	does not conduct	conducts
B	28	201	does not conduct	does not conduct
C	-39	357	conducts	conducts
D	-189	-101	does not conduct	does not conduct
E	2157	2895	does not conduct	does not conduct
F	1024	1598	does not conduct	conducts

a) Which of these compounds could have an ionic structure? .....

b) Which of these compounds could have a simple molecular structure? .....

c) Which of these compounds could have a metallic structure? .....

d) Which of these compounds could have a giant covalent structure? .....

3) Write the formula of the following ionic compounds.

a) potassium oxide .....

b) magnesium nitrate .....

c) aluminium hydroxide .....

d) copper carbonate .....

e) ammonium hydroxide .....

f) iron (III) oxide .....

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4) a) **Aluminium oxide** is an ionic substance with formula **Al_2O_3**. Explain what this formula means.

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b) Explain why aluminium oxide has a high melting point. ……

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c) Explain why aluminium oxide does not conduct electricity as a solid but does when melted.

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5) a) **Aluminium** is a metal. Explain why it has a high melting point. ……

……

b) Explain why aluminium conducts electricity. ……

……

6) a) **Ammonia** is a simple molecular substance with formula **NH_3**. Explain what this formula means.

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b) Explain why ammonia has a low melting point. ……

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c) Explain why ammonia does not conduct electricity in any state. ……

……

……

7) a) Explain why **diamond** is hard but **graphite** is soft. ……

……

……

b) Explain why graphite conducts electricity but diamond does not. ……

……

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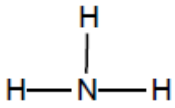
5) Complete the table to draw any missing stick or dot-cross diagrams for the molecules shown below.

Substance	ammonia NH_3	oxygen O_2	oxygen fluoride OF_2
Stick diagram			
Dot-cross diagram			

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Worksheet 5: Writing chemical formula

Complete the table with the formula of the ions (e.g. magnesium ion is Mg^{2+}) and the ionic compounds.

	Name	Formula
1	sodium ion	
2	chloride ion	
3	sulfate ion	
4	cobalt(II) ion	
5	potassium oxide	
6	calcium hydroxide	
7	iron(III) oxide	
8	aluminium bromide	
9	magnesium nitrate	
10	lithium carbonate	

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Worksheet 6: Science in the News

Find a recent science-related news article (from BBC Science, New Scientist, or similar).
- Summarise the article in your own words.
- Identify which branch of science it relates to (biology, chemistry, or physics).
- Explain why this topic is important to society.

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Worksheet 7: Lab Safety Poster

Design a poster (digital or hand-drawn) showing 10 key lab safety rules.

- Include symbols for hazards (e.g., corrosive, flammable).
- Explain why each rule is important.