



LIONHEART
EDUCATIONAL TRUST

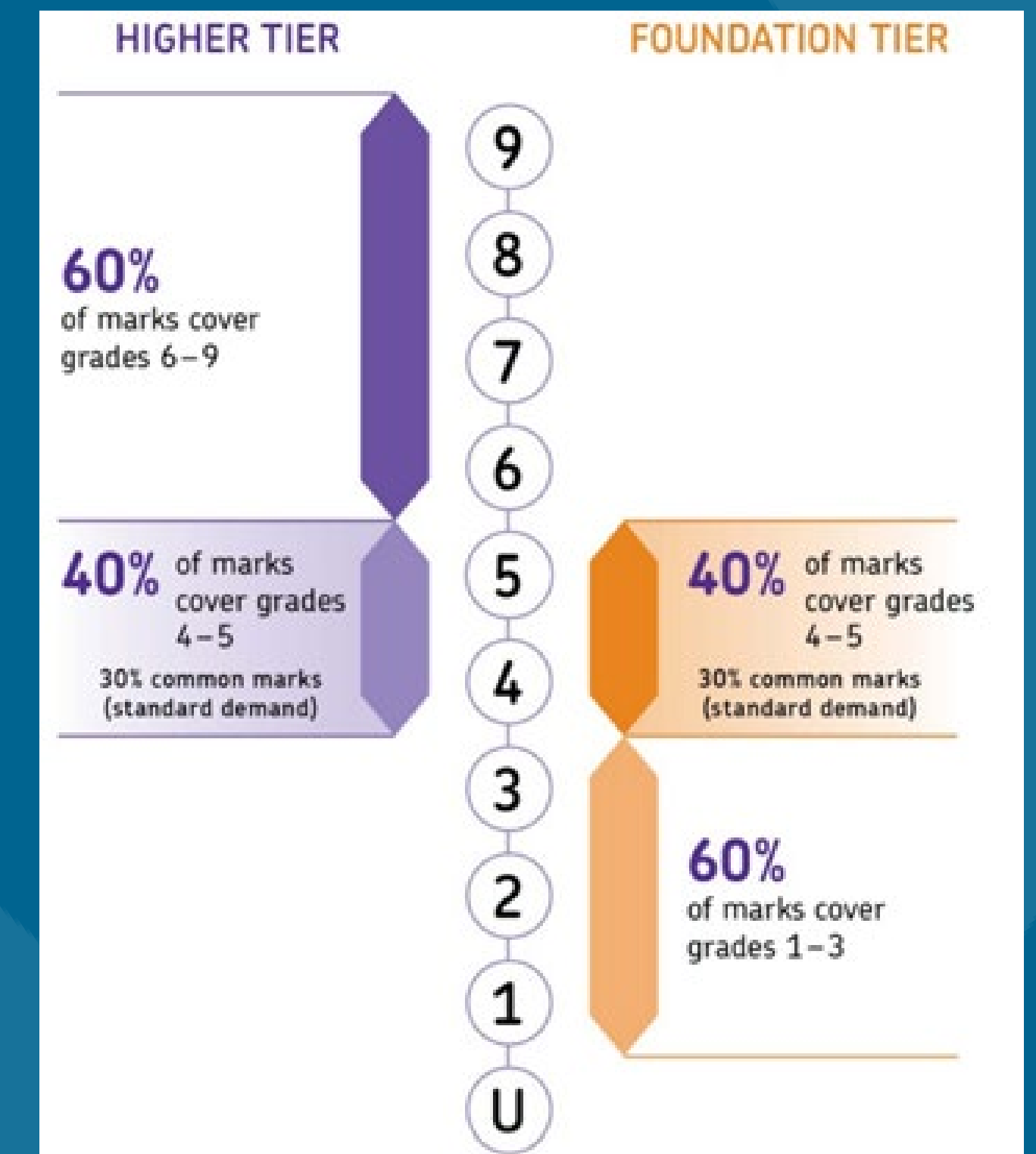
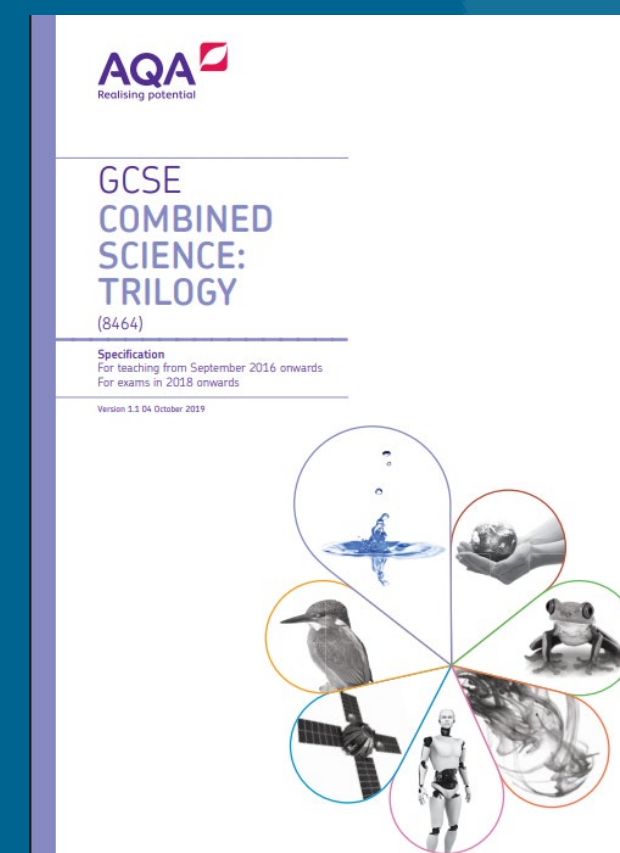
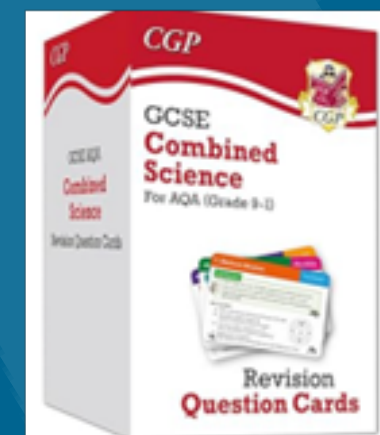
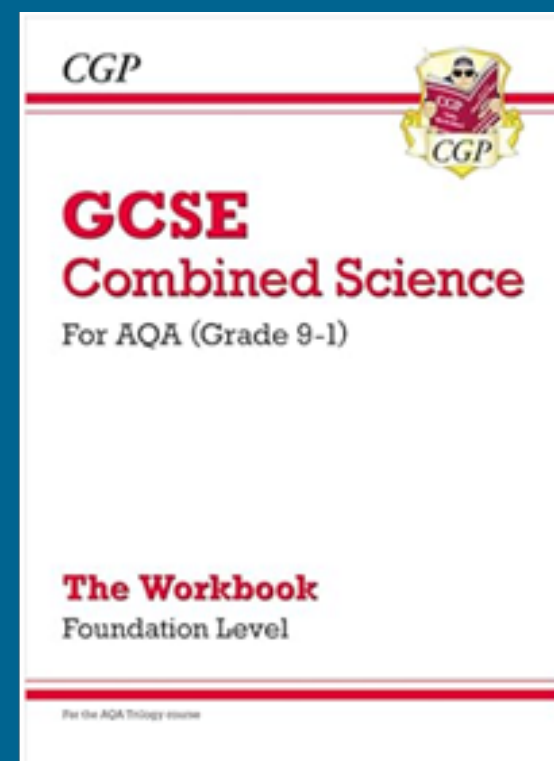
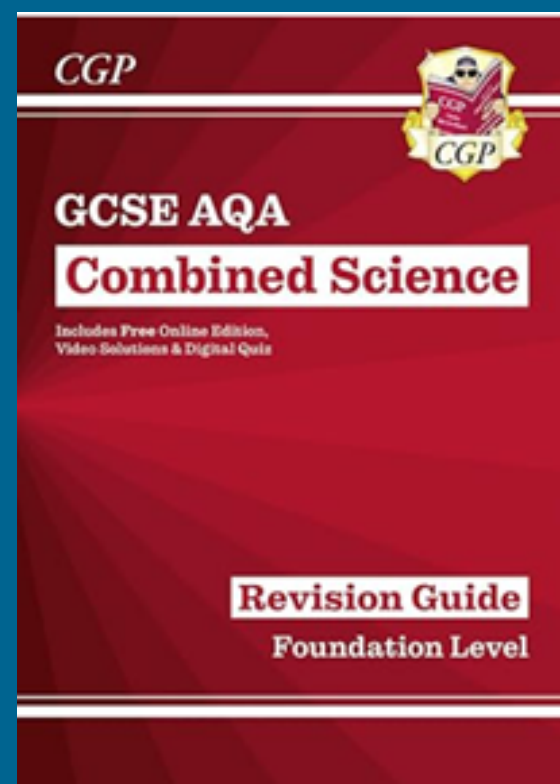
AQA COMBINED SCIENCE TRILOGY – BIOLOGY, CHEMISTRY & PHYSICS
AQA GCSE BIOLOGY, AQA GCSE CHEMISTRY, AQA GCSE PHYSICS

IN COMBINED SCIENCE TRILOGY STUDENTS WILL SIT TWO EXAM PAPERS FOR EACH SUBJECT DISCIPLINE – PAPER 1 & PAPER 2.

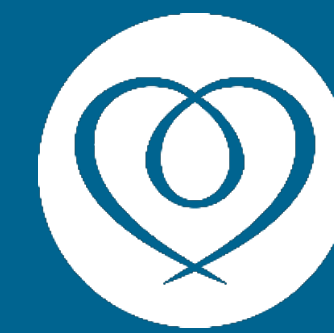
STUDENTS CAN BE ENTERED FOR THE PAPERS AT HIGHER TIER LEVEL OR FOUNDATION TIER LEVEL



SPECIFICATIONS: [CLICK HERE](#)



COMBINED SCIENCE TRILOGY TOPICS



Biology

1. Cell biology
2. Organisation
3. Infection and response
4. Bioenergetics
5. Homeostasis and response
6. Inheritance, variation and evolution
7. Ecology

Chemistry

8. Atomic structure and the periodic table
9. Bonding, structure and the properties of matter
10. Quantitative chemistry
11. Chemical changes
12. Energy changes
13. The rate and extent of chemical change
14. Organic chemistry
15. Chemical analysis
16. Chemistry of the atmosphere
17. Using resources

Physics

18. Energy
19. Electricity
20. Particle model of matter
21. Atomic structure
22. Forces
23. Waves
24. Magnetism and electromagnetism

COMBINED SCIENCE TRILOGY ASSESSMENT TOPICS



Biology Paper 1
What's assessed Biology topics 1–4: Cell Biology; Organisation; Infection and response; and Bioenergetics.
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 15 minutes• Foundation and Higher Tier• 70 marks• 16.7% of GCSE
Questions Multiple choice, structured, closed short answer, and open response.



Biology Paper 2
What's assessed Biology topics 5–7: Homeostasis and response; Inheritance, variation and evolution; and Ecology.
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 15 minutes• Foundation and Higher Tier• 70 marks• 16.7% of GCSE
Questions Multiple choice, structured, closed short answer, and open response.



Chemistry Paper 1
What's assessed Chemistry topics 8–12: Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry; Chemical changes; and Energy changes.
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 15 minutes• Foundation and Higher Tier• 70 marks• 16.7% of GCSE
Questions Multiple choice, structured, closed short answer, and open response.



Chemistry Paper 2
What's assessed Chemistry topics 13–17: The rate and extent of chemical change; Organic chemistry; Chemical analysis; Chemistry of the atmosphere; and Using resources. Questions in Paper 2 may draw on fundamental concepts and principles from Sections 5.1 to 5.3.
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 15 minutes• Foundation and Higher Tier• 70 marks• 16.7% of GCSE
Questions Multiple choice, structured, closed short answer, and open response.



Physics Paper 1
What's assessed Physics topics 18–21: Energy; Electricity; Particle model of matter; and Atomic structure.
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 15 minutes• Foundation and Higher Tier• 70 marks• 16.7% of GCSE
Questions Multiple choice, structured, closed short answer, and open response.



Physics Paper 2
What's assessed Physics topics 22–24: Forces; Waves; and Magnetism and electromagnetism
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 15 minutes• Foundation and Higher Tier• 70 marks• 16.7% of GCSE
Questions Multiple choice, structured, closed short answer, and open response.

Performance in all six exams will be combined to generate the final combined grades.

REQUIRED PRACTICAL FOR COMBINED TRILOGY



Required practical activity	Trilogy
Microscopy	✓
Osmosis	✓
Enzymes	✓
Food tests	✓
Photosynthesis	✓
Reaction time	✓
Field investigations	✓
Plant responses	X
Decay	X
Microbiology	X
Making salts	✓
Temperature changes	✓
Rates of reaction	✓
Chromatography	✓
Water purification	✓
Electrolysis	✓
Neutralisation	X
Identifying ions	X
Specific heat capacity	✓
Resistance	✓
I-V characteristics	✓
Density	✓

Force and extension	✓
Acceleration	✓
Waves	✓
Radiation and absorption	✓
Thermal insulation	X
Light	X

X Not required for combined trilogy

Revision resources are available from class teachers to help to revise the required practicals.

Required practical activity	Trilogy	Biology	Chemistry	Physics
Microscopy	✓	✓		
Osmosis	✓	✓		
Enzymes	✓	✓		
Food tests	✓	✓		
Photosynthesis	✓	✓		
Reaction time	✓	✓		
Field investigations	✓	✓		
Plant responses				
Decay				
Microbiology				

Do you feel confident enough to answer any question on the **BIOLOGY** required practical and gain marks which could improve your grade?

Which practical can you expect to be asked about on paper 1?

Which practical can you expect to be asked about on paper 2?

Microscopy: [click here](#)

Osmosis: [click here](#)

Enzymes: [click here](#)

Food Tests: [click here](#)

Photosynthesis: [click here](#)

Reaction Time: [click here](#)

Field Investigations: [click here](#)

While you watch the video annotate the matching worksheet with notes.

Then complete the set of exam questions on the practical and check your answers against the mark scheme.

	Trilogy	Biology	Chemistry	Physics
Making salts	✓		✓	
Temperature changes	✓		✓	
Rates of reaction	✓		✓	
Chromatography	✓		✓	
Water purification	✓		✓	
Electrolysis	✓		✓	
Neutralisation				
Identifying ions				

Do you feel confident enough to answer any question on the **CHEMISTRY** required practical and gain marks which could improve your grade?

Which practical can you expect to be asked about on paper 1?

Which practical can you expect to be asked about on paper 2?

Making pure dry salts: [click here](#)

Temperature changes: [click here](#)

Rates of reaction: [click here](#)

Chromatography: [click here](#)

Water purification: [click here](#)

Electrolysis: [click here](#)

While you watch the video annotate the matching worksheet with notes.

Then complete the set of exam questions on the practical and check your answers against the mark scheme.

	Trilogy	Biology	Chemistry	Physics
Specific heat capacity	✓			✓
Resistance	✓			✓
I-V characteristics	✓			✓
Density	✓			✓
Force and extension	✓			✓
Acceleration	✓			✓
Waves	✓			✓
Radiation and absorption	✓			✓
Thermal insulation				
Light				

Do you feel confident enough to answer any question on the **PHYSICS** required practical and gain marks which could improve your grade?

Which practical can you expect to be asked about on paper 1?

Which practical can you expect to be asked about on paper 2?

Specific heat capacity: [click here](#)

Measuring resistance: [click here](#)

I-V characteristics: [click here](#)

Calculating density: [click here](#)

Force and extension: [click here](#)

Radiation and absorption: [click here](#)

Waves: [click here](#)

Acceleration: [click here](#)

While you watch the video annotate the matching worksheet with notes.

Then complete the set of exam questions on the practical and check your answers against the mark scheme.

PERIODIC TABLES AND EQUATION SHEETS



Students will be provided with a periodic table in the chemistry exams and an equation sheet in the physics exams. There is no equation sheet for biology.

AQA

The Periodic Table of 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

23

Na

sodium

11

24

Mg

magnesium

12

relative atomic mass

atomic symbol

name

atomic (proton) number

11	12	14	16	19	20												
B	C	N	O	F	Ne												
boron	carbon	nitrogen	oxygen	fluorine	neon												
5	6	7	8	9	10												
27	28	31	32	35.5	40												
Al	Si	P	S	Cl	Ar												
aluminium	silicon	phosphorus	sulfur	chlorine	argon												
13	14	15	16	17	18												
39	40	45	48	51	52	55	56	59	59	63.5	65	70	73	75	79	80	84
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
85	88	89	91	93	96	[98]	101	103	106	108	112	115	119	122	128	127	131
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
133	137	139	178	181	184	186	190	192	195	197	201	204	207	209	[209]	[210]	[222]
Cs	Ba	La*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
[223]	[226]	[227]	[261]	[262]	[266]	[264]	[277]	[268]	[271]	[272]	[285]	[286]	[289]	[289]	[293]	[294]	[294]
Fr	Ra	Ac*	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for Cu and Cl have not been rounded to the nearest whole number.

Insert for GCSE Chemistry (8462), Combined Science: Trilogy (8464), and Combined Science: Synergy (8465) papers v1

AQA

Physics Equations Sheet

GCSE Combined Science: Trilogy (8464)

and GCSE Combined Science: Synergy (8465)

FOR USE IN JUNE 2024 ONLY

HT = Higher Tier only equations

kinetic energy = 0.5 × mass × (speed) ²	$E_k = \frac{1}{2} m v^2$
elastic potential energy = 0.5 × spring constant × (extension) ²	$E_e = \frac{1}{2} k e^2$
gravitational potential energy = mass × gravitational field strength × height	$E_p = m g h$
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
charge flow = current × time	$Q = I t$
potential difference = current × resistance	$V = I R$
power = potential difference × current	$P = V I$
power = (current) ² × resistance	$P = I^2 R$
energy transferred = power × time	$E = P t$

Physics Equations Sheet –
GCSE Combined Science: Trilogy (8464) and GCSE Combined Science: Synergy (8465)
FOR USE IN JUNE 2024 ONLY

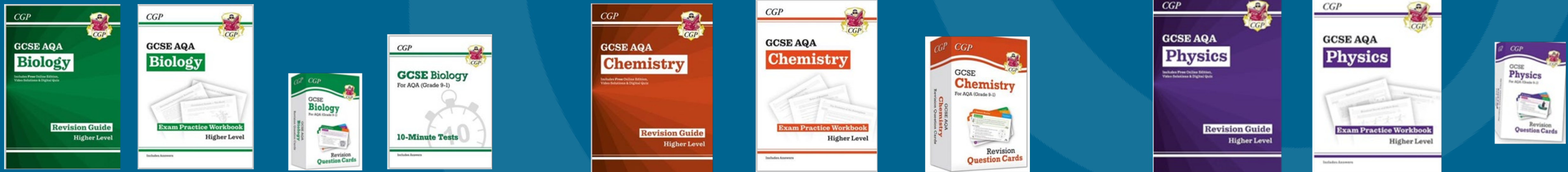
Turn over ▶

	energy transferred = charge flow × potential difference	$E = Q V$
HT	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$
	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
	thermal energy for a change of state = mass × specific latent heat	$E = m L$
	weight = mass × gravitational field strength	$W = m g$
	work done = force × distance (along the line of action of the force)	$W = F s$
	force = spring constant × extension	$F = k e$
	distance travelled = speed × time	$s = v t$
	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
	(final velocity) ² – (initial velocity) ² = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
	resultant force = mass × acceleration	$F = m a$
HT	momentum = mass × velocity	$p = m v$
	period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	wave speed = frequency × wavelength	$v = f \lambda$
HT	force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length	$F = B I l$

IN SEPARATE GCSE SCIENCE QUALIFICATIONS (TRIPLE SCIENCE) EACH SUBJECT DISCIPLINE WILL HAVE TWO PAPERS (PAPER 1 & PAPER 2)



SPECIFICATIONS CAN BE FOUND ON THE AQA WEBSITE.



ASSESSMENT TOPICS GCSE BIOLOGY



Paper 1

What's assessed

Topics 1–4: Cell biology; Organisation; Infection and response; and Bioenergetics.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50 % of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

+

Paper 2

What's assessed

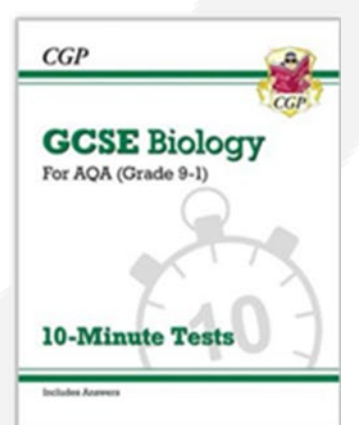
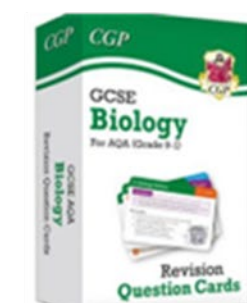
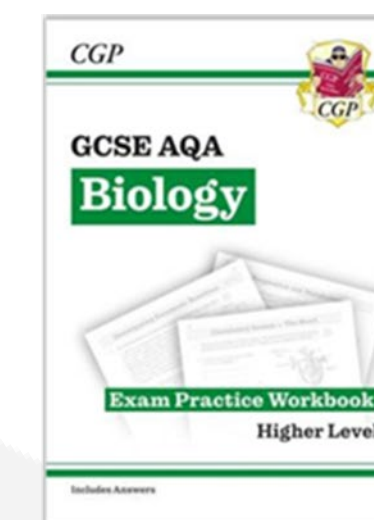
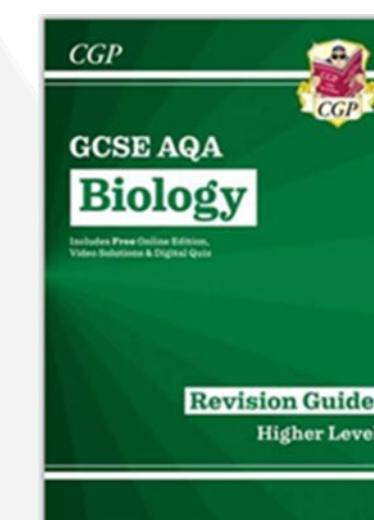
Topics 5–7: Homeostasis and response; Inheritance, variation and evolution; and Ecology.

How it's assessed

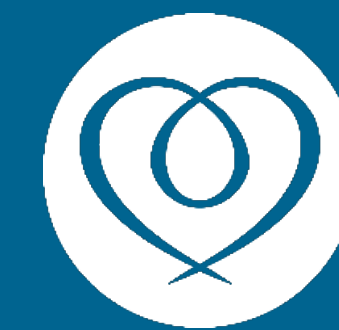
- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50 % of GCSE

Questions

Multiple choice, structured, closed short answer and open response.



ASSESSMENT TOPICS GCSE CHEMISTRY



Paper 1:

What's assessed

Topics 1–5: Atomic structure and the periodic table; Bonding, structure, and the properties of matter; Quantitative chemistry, Chemical changes; and Energy changes.

How it's assessed

- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.



Paper 2:

What's assessed

Topics 6–10: The rate and extent of chemical change; Organic chemistry; Chemical analysis, Chemistry of the atmosphere; and Using resources.

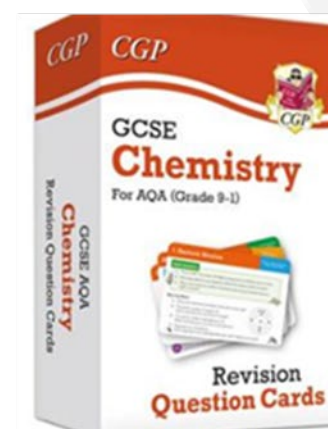
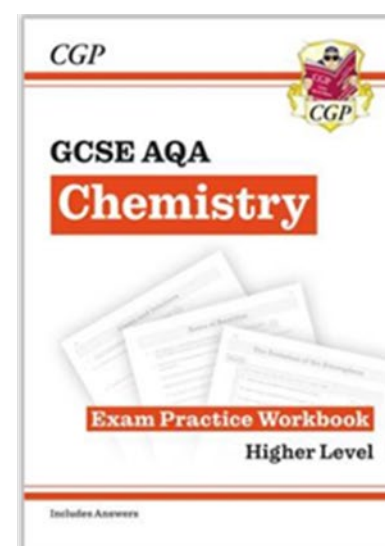
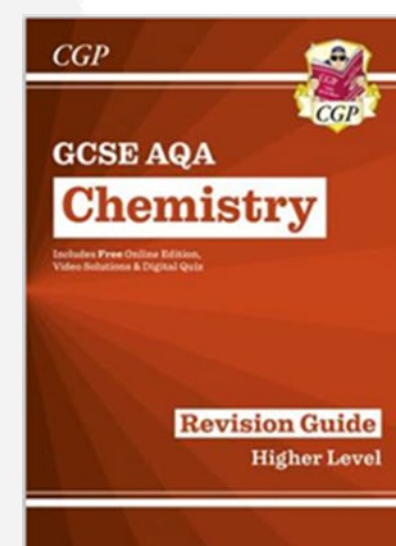
Questions in Paper 2 may draw on fundamental concepts and principles from sections 4.1 to 4.3.

How it's assessed

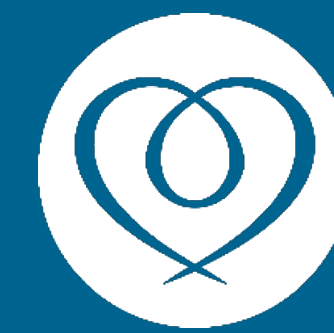
- Written exam: 1 hour 45 minutes
- Foundation and Higher Tier
- 100 marks
- 50% of GCSE

Questions

Multiple choice, structured, closed short answer and open response.

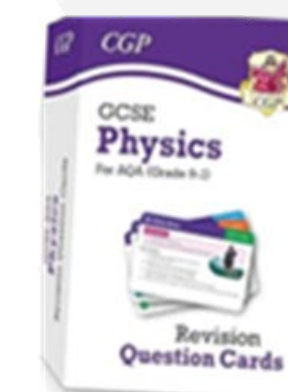
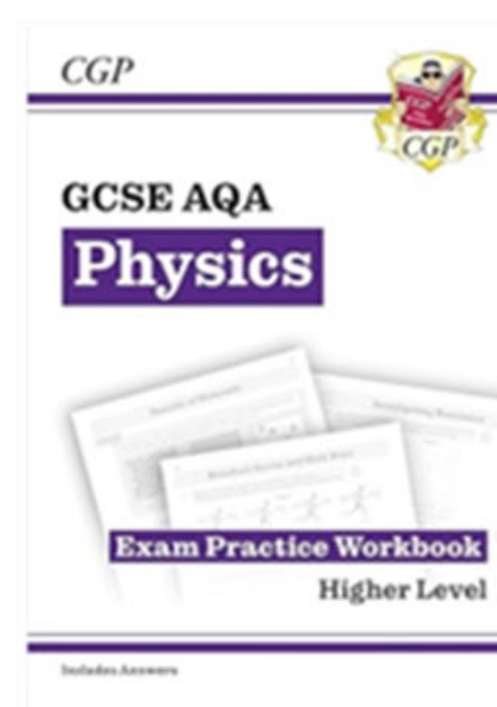
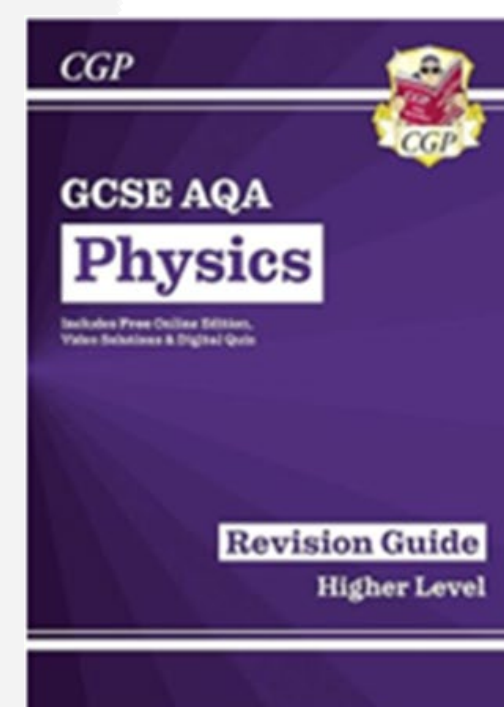


ASSESSMENT TOPICS GCSE PHYSICS

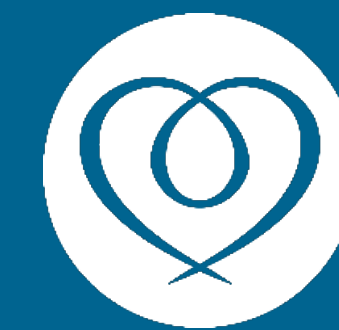


Paper 1:
What's assessed Topics 1-4: Energy; Electricity; Particle model of matter; and Atomic structure.
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 45 minutes• Foundation and Higher Tier• 100 marks• 50% of GCSE
Questions <ul style="list-style-type: none">• Multiple choice, structured, closed short answer and open response.

Paper 2:
What's assessed Topics 5-8: Forces; Waves; Magnetism and electromagnetism; and Space physics. Questions in paper 2 may draw on an understanding of energy changes and transfers due to heating, mechanical and electrical work and the concept of energy conservation from Energy (page 17) and Electricity (page 23).
How it's assessed <ul style="list-style-type: none">• Written exam: 1 hour 45 minutes• Foundation and Higher Tier• 100 marks• 50% of GCSE
Questions <ul style="list-style-type: none">• Multiple choice, structured, closed short answer and open response.



REQUIRED PRACTICAL FOR TRIPLE SCIENCE QUALIFICATIONS



Required practical activity	Trilogy	Biology	Chemistry	Physics
Microscopy	✓	✓		
Osmosis	✓	✓		
Enzymes	✓	✓		
Food tests	✓	✓		
Photosynthesis	✓	✓		
Reaction time	✓	✓		
Field investigations	✓	✓		
Plant responses		✓		
Decay		✓		
Microbiology		✓		

	Trilogy	Biology	Chemistry	Physics
Making salts	✓		✓	
Temperature changes	✓		✓	
Rates of reaction	✓		✓	
Chromatography	✓		✓	
Water purification	✓		✓	
Electrolysis	✓		✓	
Neutralisation			✓	
Identifying ions			✓	

	Trilogy	Biology	Chemistry	Physics
Specific heat capacity	✓			✓
Resistance	✓			✓
I-V characteristics	✓			✓
Density	✓			✓
Force and extension	✓			✓
Acceleration	✓			✓
Waves	✓			✓
Radiation and absorption	✓			✓
Thermal insulation				✓
Light				✓

Revision resources are available from class teachers to help to revise the required practicals.

PERIODIC TABLES AND EQUATION SHEETS



Students will be provided with a periodic table in the chemistry exams and an equation sheet in the physics exams. There is no equation sheet for biology.

AQA

The Periodic Table of 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

23

Na

sodium

11

24

Mg

magnesium

12

11

B

boron

5

12

C

carbon

6

14

N

nitrogen

7

16

O

oxygen

8

19

F

fluorine

9

20

Ne

neon

10

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

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radium

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Ac*

actinium

89

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Rf

rutherfordium

104

[262]

Db

dubnium

105

[266]

Sg

seaborgium

106

[264]

Bh

bohrium

107

[277]

Hs

hassium

108

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Mt

meitnerium

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Ds

darmstadtium

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Rg

roentgenium

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Cn

copernicium

112

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Nh

nihonium

113

[289]

Fl

flerovium

114

[289]

Mc

moscovium

115

[293]

Lv

livermorium

116

[294]

Ts

tennessine

117

[294]

Og

oganeson

118

Key

relative atomic mass

atomic symbol

name

atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for Cu and Cl have not been rounded to the nearest whole number.

Insert for GCSE Chemistry (8462), Combined Science: Trilogy (8464), and Combined Science: Synergy (8465) papers v1

AQA

Physics Equations Sheet

GCSE Combined Science: Trilogy (8464)
and GCSE Combined Science: Synergy (8465)

FOR USE IN JUNE 2024 ONLY

HT = Higher Tier only equations

kinetic energy = 0.5 × mass × (speed) ²	$E_k = \frac{1}{2} m v^2$
elastic potential energy = 0.5 × spring constant × (extension) ²	$E_e = \frac{1}{2} k e^2$
gravitational potential energy = mass × gravitational field strength × height	$E_p = m g h$
change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
efficiency = $\frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$	
efficiency = $\frac{\text{useful power output}}{\text{total power input}}$	
charge flow = current × time	$Q = I t$
potential difference = current × resistance	$V = I R$
power = potential difference × current	$P = V I$
power = (current) ² × resistance	$P = I^2 R$
energy transferred = power × time	$E = P t$

Physics Equations Sheet –
GCSE Combined Science: Trilogy (8464) and GCSE Combined Science: Synergy (8465)
FOR USE IN JUNE 2024 ONLY

Turn over ▶

	energy transferred = charge flow × potential difference	$E = Q V$
HT	potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil	$V_p I_p = V_s I_s$
	density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$
	thermal energy for a change of state = mass × specific latent heat	$E = m L$
	weight = mass × gravitational field strength	$W = m g$
	work done = force × distance (along the line of action of the force)	$W = F s$
	force = spring constant × extension	$F = k e$
	distance travelled = speed × time	$s = v t$
	acceleration = $\frac{\text{change in velocity}}{\text{time taken}}$	$a = \frac{\Delta v}{t}$
	(final velocity) ² – (initial velocity) ² = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
	resultant force = mass × acceleration	$F = m a$
HT	momentum = mass × velocity	$p = m v$
	period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$
	wave speed = frequency × wavelength	$v = f \lambda$
HT	force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length	$F = B I l$

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