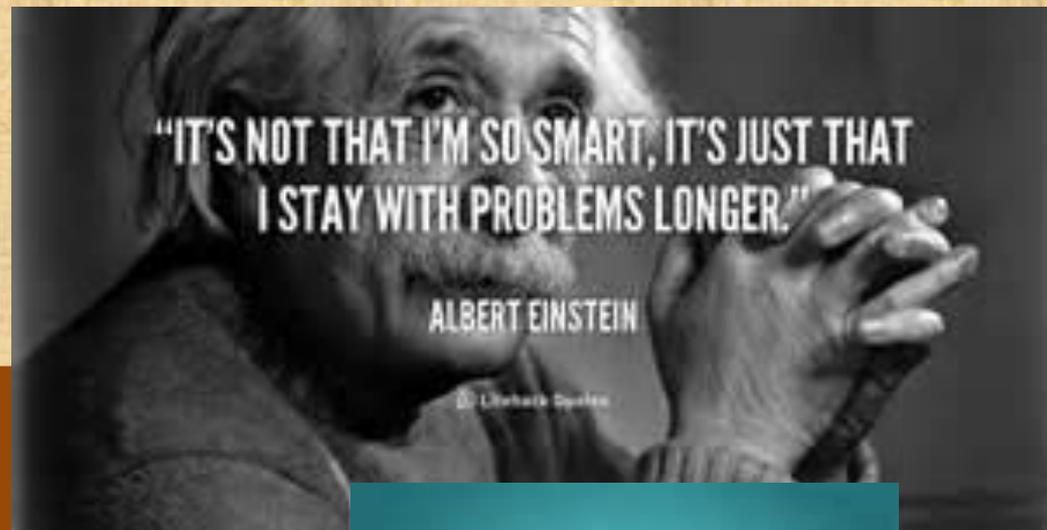


**New AQA  
GCSE Science**

**Trilogy and**

**Separate:  
Biology, Chemistry, Physics**



# Grading the New GCSEs in 2017

## Higher Tier 9 - 4

NEW GCSE GRADING STRUCTURE

9	8	7	6	5	4	3	2	1	U
Same tier of entry for all subjects			Foundation Tier 5 - 1						
			<ul style="list-style-type: none"><li>■ Broadly the same proportion of students will achieve a grade 4 and above as currently achieve a grade C and above.</li><li>■ Broadly the same proportion of students will achieve a grade 7 and above as achieve an A and above.</li><li>■ The bottom of grade 1 will be aligned with the bottom of grade G.</li></ul>						
A*	A	B	C	D	E	F	G	U	

CURRENT GCSE GRADING STRUCTURE

# Assessment Objectives and Maths

	Assessment Objectives	Weighting
AO1	Demonstrate knowledge and understanding of: <ul style="list-style-type: none"><li>• Scientific ideas and processes</li><li>• Scientific techniques and procedures</li></ul>	40%
AO2	Apply knowledge and understanding of: <ul style="list-style-type: none"><li>• Scientific ideas and processes</li><li>• Scientific techniques and procedures</li></ul>	40%
AO3	Analyse, interpret and evaluate scientific ideas, information and evidence to make judgements and reach conclusions	20%

## Maths weightings

Biology	Chemistry	Physics	Combined Science
10%	20%	30%	20% overall (in ratio 1:2:3)

# Two options: Separate and Trilogy

Three GCSEs – separate sciences

GCSE  
BIOLOGY

DRAFT 8461

GCSE  
CHEMISTRY

..... 8462

GCSE  
PHYSICS

8463

- Three separate grades are awarded.

Two GCSEs – double science

GCSE  
COMBINED  
SCIENCE:  
TRILOGY

8464

There is also a 'Synergy' version.

Specification

For teaching from September 2016 onwards

For GCSE exams in 2018 onwards

- Combined GCSE is a double award, you will be awarded two grades.
- A grading scale with 17 possibilities will be used.

9-9

9-8

8-8

8-7

7-7

7-6

6-6

6-5

5-5

5-4

4-4

4-3

3-3

3-2

2-2

2-1

1-1

# Biology subject content

1. Cell biology

2. Organisation

3. Infection and response

4. Bioenergetics

5. Homeostasis and response

6. Inheritance, variation and evolution

7. Ecology

**Within some units there is some exclusive separate science (biology only) content.**

# Biology subject content - Trilogy

1. Cell biology

2. Organisation

3. Infection and response

4. Bioenergetics

5. Homeostasis and response

6. Inheritance, variation and evolution

7. Ecology

**Within some units there is some exclusive separate science (biology only) content.**

# Chemistry subject content

1. Atomic structure and the periodic table

2. Bonding, structure and the properties of matter

3. Quantitative chemistry

4. Chemical changes

5. Energy changes

6. The rate and extent of chemical change

7. Organic chemistry

8. Chemical analysis

9. Chemistry of the atmosphere

10. Using resources

**Within some units  
there is some  
exclusive separate  
science (chemistry  
only) content.**

# Chemistry subject content - Trilogy

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

**Within some units  
there is some  
exclusive separate  
science (chemistry  
only) content.**

# Physics subject content

1. Energy

2. Electricity

3. Particle model of matter

4. Atomic structure

5. Forces

6. Waves

7. Magnetism and electromagnetism

8. Space physics

Within some units there is some exclusive separate science (physics only) content.

Space physics is only in separate GCSE Physics (8463)

# Physics subject content - Trilogy

18. Energy

19. Electricity

20. Particle model of matter

21. Atomic structure

22. Forces

23. Waves

24. Magnetism and electromagnetism

**Within some units there is some exclusive separate science (physics only) content.**

# Compulsory practical work, 15 % of exam - 10 investigations for each single GCSE,

Biology	Chemistry	Physics
1. Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.	1. Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate.	1. Determine the specific heat capacity. Linking the decrease of one energy store to the increase in temperature.
2. Effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition. (Biology only).	2. Titration – determining reacting volumes (HT only), determination of the concentration of one of the solutions in mol/dm <sup>3</sup> and g/dm <sup>3</sup> (Chemistry only)	2. Effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material. (Physics only)
3. Effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.	3. Electrolysis of aqueous solutions. An investigation involving developing a hypothesis.	3. Factors affecting the resistance of electrical circuits, including: length of a wire, resistors in series and parallel.
4. Use qualitative reagents to test for a range of carbohydrates, lipids and proteins.	4. Variables that affect temperature changes in reacting solutions – acid plus metals, acid plus carbonates, neutralisation, displacement of metals.	4. Investigate I-V characteristics of a filament lamp, a diode, and a resistor at constant temperature.
5. Effect of pH on the rate of reaction of amylase enzyme.	5. Changes in concentration affecting the rates of reactions, methods involving: measuring the volume of a gas, change in turbidity. An investigation involving developing a hypothesis.	5. Determine the densities of regular and irregular shaped objects. Dimensions to be measured using ruler, micrometer or Vernier callipers. Displacement technique for irregularly shaped objects.
6. Effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	6. Paper chromatography. Calculation of R <sub>f</sub> values.	6. Relationship between force and extension for a spring.
7. Effect of a factor on human reaction time.	7. Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections FLAME TESTS through to SULFATES. (Chemistry only)	7. Effect of varying the force on the acceleration of an object of constant mass. Effect of varying the mass of an object on the acceleration produced by a constant force.
8. Effect of light or gravity on the growth of newly germinated seedlings (Biology only)	8. Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.	8. Make observations to identify the suitability of apparatus to measure the speed of waves in a ripple tank and waves in a solid and take appropriate measurements.
9. Use sampling techniques to investigate the effect of a factor on the distribution of a common species.		9. Reflection by different types of surface. Refraction by different substances (Physics only).
10. Effect of temperature on the rate of decay of fresh milk by measuring pH change. (Biology only)		10. How the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that

# Compulsory practical work, 15 % of exam - 10 investigations for each single GCSE, 21 investigations for Trilogy

Biology	Chemistry	Physics
1 Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.	8 Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate.	14 Determine the specific heat capacity. Linking the decrease of one energy store to the increase in temperature.
2. Effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition. (Biology only).	2. Titration – determining reacting volumes (HT only), determination of the concentration of one of the solutions in mol/dm <sup>3</sup> and g/dm <sup>3</sup> (Chemistry only)	2. Effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material. (Physics only)
2 Effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.	9 Electrolysis of aqueous solutions. An investigation involving developing a hypothesis.	15 Factors affecting the resistance of electrical circuits, including: length of a wire, resistors in series and parallel.
3 Use qualitative reagents to test for a range of carbohydrates, lipids and proteins.	10 Variables that affect temperature changes in reacting solutions – acid plus metals, acid plus carbonates, neutralisation, displacement of metals.	16 Investigate I-V characteristics of a filament lamp, a diode, and a resistor at constant temperature.
4 Effect of pH on the rate of reaction of amylase enzyme.	11 Changes in concentration affecting the rates of reactions, methods involving: measuring the volume of a gas, change in turbidity. An investigation involving developing a hypothesis.	17 Determine the densities of regular and irregular shaped objects. Dimensions to be measured using ruler, micrometer or Vernier callipers. Displacement technique for irregularly shaped objects.
5 Effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.	12 Paper chromatography. Calculation of R <sub>f</sub> values.	18 Relationship between force and extension for a spring.
6 Plan and carry out an investigation into the effect of a factor on human reaction time.	7. Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections FLAME TESTS through to SULFATES. (Chemistry only)	19 Effect of varying the force on the acceleration of an object of constant mass. Effect of varying the mass of an object on the acceleration produced by a constant force.
8. Effect of light or gravity on the growth of newly germinated seedlings (Biology only)	13 Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.	20 Make observations to identify the suitability of apparatus to measure the speed of waves in a ripple tank and waves in a solid and take appropriate measurements.
7 Use sampling techniques to investigate the effect of a factor on the distribution of a common species.		9. Reflection by different types of surface. Refraction by different substances (Physics only).
10. Effect of temperature on the rate of decay of fresh milk by measuring pH change. (Biology only)		21 How the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that

**Mathematics requirements:** There are formulas that will have to be learnt.  
The following mathematical skills are needed.

## 1. Arithmetic and numerical computation

Use decimals. Use standard form. Use ratios, fractions and percentages. Make estimates.

**2. Handling data** Use significant figures. Find arithmetic means. Construct and interpret frequency tables and diagrams, bar charts and histograms. *Understand sampling (Biology questions only). Understand simple probability (Biology questions only) Understand mean, mode and median. Use a scatter diagram to identify a correlation (Biology and Physics questions only).* Make order of magnitude calculations.

**3. Algebra** Understand and use symbols:  $=$ ,  $<$ ,  $\ll$ ,  $\gg$ ,  $>$ ,  $\alpha$ ,  $\sim$ . Change the subject of an equation. *Substitute numerical values into algebraic equations, using appropriate units (Chemistry and Physics questions). Solve simple algebraic equations (Biology and Physics).*

**4. Graphs** Translate information between graphical and numeric form. Understand that  $y = mx + c$  represents a linear relationship. Plot two variables. Determine the slope and intercept of a linear graph. *Draw and use the slope of a tangent to a curve as a measure of rate of change (Chemistry and Physics questions only). Understand the significance of area between a curve and the x-axis and measure it by counting squares as appropriate (Physics questions only).*

**5. Geometry and trigonometry** *Use angular measures (Physics questions only). 2D and 3D forms (Chemistry and Physics questions only).* Calculate areas of triangles and rectangles, surface areas and volumes of cubes.

# Working scientifically WS

1. Development of scientific thinking.
2. Experimental skills and strategies.
3. Analysis and Evaluation.
4. Scientific vocabulary, quantities, units, symbols and nomenclature.

*“ If I have seen further  
it is by standing on the  
shoulder of giants.”*

*Sir Isaac Newton 1642-1727*



# Assessment – Exams at end of Y11

	Biology	Chemistry	Physics
<b>Paper 1</b>	<b>Topics 1 – 4</b>	<b>Topics 1 – 5</b>	<b>Topics 1-4</b>
<b>Paper 2</b>	<b>Topics 5 - 7</b>	<b>Topics 6 – 10</b>	<b>Topics 5-7 (+8 Physics only)</b>

	Trilogy	Separate Science
Number of papers per qualification	6	2
Questions	Multiple choice, structured, closed short answer, and open response	
Length of papers	1 hour and 15 mins	1 hour and 45 mins
Marks per paper	70	100