

## Summary of changes (certificate to new GCSE)

This resource outlines the main changes that have been made to the assessment and subject content from our current Level 1/2 Certificate in Physics (8403) to the new GCSE Physics specification (8463).

Our new specifications have been developed in line with the regulatory requirements provided by the Department for Education (DfE) and Ofqual.

### 4.1 Forces

#### 4.1.1 Forces and their interactions

Section	Current specification (8403)	What's changed
4.1.1.1 Scalar and vector quantities	1.1a Motion	New: arrows as representation of vector quantities
4.1.1.2 Contact and non-contact forces	1.1a Motion	New: contact and non-contact forces
4.1.1.3 Gravity	1.5c Forces and terminal velocity	New: <ul style="list-style-type: none"> <li>• definition of force of gravity</li> <li>• definition of centre of mass</li> <li>• proportionality of weight and mass</li> <li>• use of newtonmeter.</li> </ul>
4.1.1.4 Resultant forces	1.2b Resultant forces	New: <ul style="list-style-type: none"> <li>• free body diagrams</li> <li>• component forces</li> <li>• vector diagrams.</li> </ul> <p>Most content is Higher Tier only</p>

### 4.1.2 Work done and energy transfer

Section	Current specification (8403)	What's changed
4.1.2 Work done and energy transfer	1.7a, b, c, d Forces and energy	New: definition of joule

### 4.1.3 Forces and elasticity

Section	Current specification (8403)	What's changed
4.1.3 Forces and elasticity	1.6a, b, c, d Forces and elasticity	New: <ul style="list-style-type: none"> <li>• compression of elastic objects</li> <li>• limit of proportionality</li> <li>• equation <math>E_e = \frac{1}{2} k e^2</math></li> </ul>

### 4.1.4 Moments, levers and gears (physics only)

Section	Current specification (8403)	What's changed
4.1.4 Moments, levers and gears	1.9a, b, c, d Moments	
N/A	1.8a, b, c, d, e Centre of mass 1.9e Moments	This content is no longer present in the new specification.

### 4.1.5 Pressure and pressure differences in fluids (physics only)

#### 4.1.5.1 Pressure in a fluid

Section	Current specification (8403)	What's changed
4.1.5.1.1 Pressure in a fluid 1	1.11a, b, c Hydraulics	New: <ul style="list-style-type: none"> <li>• pressure acting at right-angles to a surface</li> <li>• pressure at a surface.</li> </ul>
4.1.5.1.2 Pressure in a fluid 2		New topic Higher Tier only

#### 4.1.5.2 Atmospheric pressure

Section	Current specification (8403)	What's changed
4.1.5.2 Atmospheric pressure		New topic

#### 4.1.6 Forces and motion

##### 4.1.6.1 Describing motion along a line

Section	Current specification (8403)	What's changed
4.1.6.1.1 Distance and displacement	1.1a Motion	New: definitions of distance and displacement
4.1.6.1.2 Speed	1.1a, e Motion	New: <ul style="list-style-type: none"> <li>• typical values of speeds</li> <li>• distance travelled in a specific time.</li> </ul>
4.1.6.1.3 Velocity	1.1a, d Motion	New: velocity changes in circular motion Velocity changes in circular motion is Higher Tier only.
4.1.6.1.4 The distance–time relationship	1.1b, c Motion	
4.1.6.1.5 Acceleration	1.1f, g, h Motion 1.5b Forces	New: <ul style="list-style-type: none"> <li>• average acceleration</li> <li>• negative accelerations</li> <li>• <math>v^2 - u^2 = 2 a s</math></li> </ul> Content no longer Higher Tier only
N/A	1.5a Forces and terminal velocity 1.10a, b, c Circular motion	This content is no longer present in the new specification.

#### 4.1.6.2 Forces, accelerations and Newton's Laws of motion

Section	Current specification (8403)	What's changed
4.1.6.2.1 Newton's First Law	1.2c, d, e Resultant forces 1.4a Forces and braking	New: inertia Some content is Higher Tier only.
4.1.6.2.2 Newton's Second Law	1.2f Resultant forces	New: inertial mass Some content is Higher Tier only.
4.1.6.2.3 Newton's Third Law	1.2a Resultant forces	New: application to equilibrium situations

#### 4.1.6.3 Forces and braking

Section	Current specification (8403)	What's changed
4.1.6.3.1 Stopping distance	1.4b, c Forces and braking	
4.1.6.3.2 Reaction time	1.4d Forces and braking	New: typical values for reaction times
4.1.6.3.3 Factors affecting braking distance 1	1.4f Forces and braking	
4.1.6.3.4 Factors affecting braking distance 2	1.4e Forces and braking	New: relation between speed, braking force and deceleration Some content is Higher Tier only.

#### 4.1.7 Momentum

Section	Current specification (8403)	What's changed
4.1.7.1 Momentum is a property of moving objects	1.3a Momentum	Higher Tier only.
4.1.7.2 Conservation of momentum	1.3b Momentum	Higher Tier only.
4.1.7.3 Changes in momentum (physics only)	1.3c Momentum	New: equation $F = \frac{m\Delta v}{\Delta t}$ Higher Tier only

## 4.2 Energy

### 4.2.1 Energy changes in a system, and the ways energy is stored before and after such changes

Section	Current specification (8403)	What's changed
4.2.1.1 Energy stores and systems		New topic
4.2.1.2 Changes in energy	1.7f, g Forces and energy	New: elastic potential energy, $E_e = \frac{1}{2} k e^2$
4.2.1.3 Energy changes in systems	3.1c, d Kinetic theory	
4.2.1.4 Work	1.7a, b Forces and energy	
4.2.1.5 Power	1.7e Forces and energy 4.3b Transferring electrical energy	New: <ul style="list-style-type: none"> <li>relation between power and energy</li> <li>watt.</li> </ul>

### 4.2.2 Conservation and dissipation of energy

Section	Current specification (8403)	What's changed
4.2.2.1 Energy transfers in a system	3.4a, b, c Energy transfers and efficiency 3.5b Heating and insulating buildings	New: <ul style="list-style-type: none"> <li>energy transfers in closed systems</li> <li>preventing unwanted energy transfers.</li> </ul>
4.2.2.2 Efficiency	3.4d Energy transfers and efficiency	New: increasing efficiency of energy transfer Increasing efficiency of energy transfer is Higher Tier only
N/A	3.4e Energy transfers and efficiency 3.5a, c, d Heating and insulating buildings	This content is no longer present in the new specification

## 4.2.3 National and global energy resources

Section	Current specification (8403)	What's changed
4.2.3 National and global energy resources		New topic

## 4.3 Waves

### 4.3.1 Waves in air, fluids and solids

Section	Current specification (8403)	What's changed
4.3.1.1 Transverse and longitudinal waves	2.1a, b, c General properties of waves	New: detail on evidence for wave moving
4.3.1.2 Properties of waves	2.1g, h General properties of waves	New: <ul style="list-style-type: none"> <li>definitions</li> <li>period formula: <math>T = \frac{1}{f}</math></li> <li>inter-relationship of changes in velocity, frequency and wavelength in transmission between media.</li> </ul>
4.3.1.3 Reflection of waves (physics only)	2.4a, b, c Reflection	New: waves can be absorbed or transmitted at a boundary
4.3.1.4 Sound waves (physics only)	2.3a, b, c Sound and ultrasound	New: <ul style="list-style-type: none"> <li>sound travels in solids</li> <li>sound waves in the ear.</li> </ul> Higher Tier only
4.3.1.5 Waves for detection and exploration (physics only)	2.3d, e, f, g, i Sound and ultrasound	New: <ul style="list-style-type: none"> <li>seismic waves</li> <li>echo sounding.</li> </ul>
N/A	2.1f General properties of waves 2.3h Sound and ultrasound	This content is no longer present in the new specification.

### 4.3.2 Electromagnetic waves

Section	Current specification (8403)	What's changed
4.3.2.1 Types of electromagnetic waves	2.1d General properties of waves 2.2a The electromagnetic spectrum	New: <ul style="list-style-type: none"> <li>EM waves transfer energy from source to absorber</li> <li>detail of electromagnetic spectrum.</li> </ul>
4.3.2.2 Properties of electromagnetic waves 1	2.1e General properties of waves 2.5a Refraction and total internal reflection	Most content is Higher Tier only.
4.3.2.3 Properties of electromagnetic waves 2	2.2d, e, h The electromagnetic spectrum 6.2c Atoms and radiation	New: <ul style="list-style-type: none"> <li>radio waves</li> <li>units: sieverts.</li> </ul> Radio waves Higher Tier only.
4.3.2.4 Uses and applications of electromagnetic waves	2.2c The electromagnetic spectrum	New: <ul style="list-style-type: none"> <li>infrared for cooking/cameras</li> <li>ultraviolet for lamps/tanning.</li> </ul>
4.3.2.5 Lenses (physics only)	2.5d Refraction and total internal reflection 2.6a, b, c, d, e, f, g, h Lenses and the eye	
4.3.2.6 Visible light (physics only)		New topic
N/A	2.2b, f The electromagnetic spectrum 2.5b, c, e, f, g Refraction and total internal reflection 2.6i, k, l, m, n, o, p Lenses and the eye	This content is no longer present in the new specification.

### 4.3.3 Black body radiation (physics only)

Section	Current specification (8403)	What's changed
4.3.3.1 Emission and absorption of infrared radiation	3.3a, b, c, d, e Infrared radiation	
4.3.3.2 Perfect black bodies and radiation		New topic Most content is Higher tier only

## 4.4 Electricity

### 4.4.1 Current, potential difference and resistance

Section	Current specification (8403)	What's changed
4.4.1.1 Standard circuit diagram symbols	4.1e Electrical circuits	
4.4.1.2 Electrical charge and current	4.1b, c Electrical circuits	New: <ul style="list-style-type: none"><li>• requirement for source of potential difference</li><li>• rate of flow of charge</li><li>• current in a closed loop.</li></ul>
4.4.1.3 Current, resistance and potential difference	4.1g, h, i Electrical circuits	
4.4.1.4 Resistors	4.1e, f, j, k, l	New: applications of thermistors.
N/A	4.1a, p, q Electrical circuits	This content is no longer present in the new specification.



#### 4.4.2 Series and parallel circuits

Section	Current specification (8403)	What's changed
4.4.2 Series and parallel circuits	4.1m, n, o Electrical circuits	New: equation $R_{total} = R_1 + R_2$

#### 4.4.3 Domestic uses and safety

Section	Current specification (8403)	What's changed
4.4.3.1 Direct and alternating current	4.2a, b, c Household electricity	
4.4.3.2 Mains electricity	4.2e Household electricity	New: <ul style="list-style-type: none"> <li>detail on function of Earth, live and neutral wire</li> <li>cause of electric shock.</li> </ul> Knowledge of three-pin plug no longer required.
4.4.3.3 Insulation, fuses and circuit breakers (physics only)	4.2f, g, h, i, j Household electricity	
N/A	4.2d Household electricity	This content is no longer present in the new specification.

#### 4.4.4 Energy transfers

Section	Current specification (8403)	What's changed
4.4.4.1 Power	4.3a, c Transferring electrical energy	New: equation $P = I^2 R$
4.4.4.2 Energy transfers in everyday appliances	4.1d Electrical circuits 4.3b, d, e, f, g Transferring electrical energy	
4.4.4.3 The National Grid	4.4a, b, c The National Grid	

#### 4.4.5 Static electricity (physics only)

Section	Current specification (8403)	What's changed
4.4.5.1 Static charge		New topic
4.4.5.2 Electric fields		New topic

### 4.5 Magnetism and electromagnetism

#### 4.5.1 Permanent and induced magnetism, magnetic forces and fields

Section	Current specification (8403)	What's changed
4.5.1.1 Poles of a magnet		New topic
4.5.1.2 Magnetic fields		New topic

#### 4.5.2 The motor effect

Section	Current specification (8403)	What's changed
4.5.2.1 Electromagnetism	5.1b The motor effect	New: solenoids
4.5.2.2 Fleming's left-hand rule	5.1c, d, e The motor effect	New: <ul style="list-style-type: none"><li>magnetic flux density and size of force</li><li>equation <math>F = B I l</math></li></ul>
4.5.2.3 Electric motors		New topic Higher Tier only.
4.5.3.4 Loudspeakers (physics only)		New topic Higher Tier only
N/A	5.1a The motor effect	This content is no longer present in the new specification.

### 4.5.3 Induced potential, transformers and the National Grid (physics only)

Section	Current specification (8403)	What's changed
4.5.3.1 Induced potential	5.2a, b, c, d, e, f The generator effect	Higher Tier only
4.5.3.2 Uses of the generator effect	5.2f The generator effect	Higher Tier only
4.5.3.3 Microphones		New topic
4.5.3.4 Transformers	5.3a, b, c, d, e, f Transformers	Higher Tier only
N/A	5.3g Transformers	This content is no longer present in the new specification.

## 4.6 Particle model of matter

### 4.6.1 Changes of state and the particle model

Section	Current specification (8403)	What's changed
4.6.1.1 Density of materials		New topic
4.6.1.2 Changes of state	3.1a Kinetic theory	New: conservation of mass in state change

### 4.6.2 Internal energy and energy transfers

Section	Current specification (8403)	What's changed
4.6.2.1 Internal energy	3.1a, b Kinetic theory	New: concept of energy stores and systems
4.6.2.2 Temperature changes in a system and specific heat capacity	3.1c, d Kinetic theory	

4.6.2.3 Changes of heat and specific latent heat	3.1e, f, g, h Kinetic theory	
N/A	3.1i Kinetic theory 3.2a, b, c, d, e Energy transfer by heating	This content is no longer present in the new specification.

### 4.6.3 Particle model and pressure

Section	Current specification (8403)	What's changed
4.6.3.1 Particle motion in gases		New topic
4.6.3.2 Pressure in gases (physics only)		New topic
4.6.3.3 Increasing the pressure of a gas (physics only)		New topic Higher Tier only

## 4.7 Atomic structure

### 4.7.1 Atoms and isotopes

Section	Current specification (8403)	What's changed
4.7.1.1 The structure of an atom (common content with chemistry)	6.1a Atomic structure	New: <ul style="list-style-type: none"> <li>relative dimension of nuclear radius compared to the whole atom</li> <li>energy shells.</li> </ul>
4.7.1.2 Mass number, atomic number and isotopes (common content with chemistry)	6.1b, c, d, e Atomic structure	
4.7.1.3 The development of the model of the atom (common content with chemistry)		New topic

## 4.7.2 Atoms and nuclear radiation

Section	Current specification (8403)	What's changed
4.7.2.1 Radioactive decay and nuclear radiation	6.2a, c, e Atoms and radiation	New: <ul style="list-style-type: none"> <li>• definition of Becquerel</li> <li>• definition of count rate</li> <li>• extension of information on penetrating properties.</li> </ul>
4.7.2.2 Nuclear equations	6.2d Atoms and radiation	New: examples
4.7.2.3 Half-lives and the random nature of radioactive decay	6.2h Atoms and radiation	New: <ul style="list-style-type: none"> <li>• randomness of radioactive decay</li> <li>• determination of half-life.</li> </ul> Some content is Higher Tier only.
4.7.2.4 Radioactive contamination	6.2g Atoms and radiation	New: <ul style="list-style-type: none"> <li>• definitions of contamination and irradiation</li> <li>• precautions against nuclear radiation.</li> </ul>
N/A	6.2f Atoms and radiation	This content is no longer present in the new specification.

## 4.7.3 Hazards and uses of radioactive emissions and of background radiation (physics only)

Section	Current specification (8403)	What's changed
4.7.3.1 Background radiation	6.2b Atoms and radiation	New: radiation dose
4.7.3.2 Different half-lives of radioactive isotopes		New topic
4.7.3.3 Uses of nuclear radiation	2.2g, h The electromagnetic spectrum	

#### 4.7.4 Nuclear fission and fusion (physics only)

Section	Current specification (8403)	What's changed
4.7.4.1 Nuclear fission	6.3a, d, e Nuclear fission	New: <ul style="list-style-type: none"><li>• energy in fission reactions</li><li>• controlling chain reactions.</li></ul>
4.7.4.2 Nuclear fusion	6.4a Nuclear fusion	New: <ul style="list-style-type: none"><li>• conversion of mass to energy</li><li>• conditions needed for fusion.</li></ul>
N/A	6.3b, c Nuclear fission	This content is no longer present in the new specification.

#### 4.8 Space physics (physics only)

##### 4.8.1 Solar system; stability of orbital motions; satellites (physics only)

Section	Current specification (8403)	What's changed
4.8.1.1 Our solar system		New topic
4.8.1.2 The life cycle of a star	6.4b, c, d, e, f Nuclear fusion	
4.8.1.3 Orbital motion, natural and artificial satellites		New topic Some content is Higher Tier only

##### 4.8.2 Red-shift (physics only)

Section	Current specification (8403)	What's changed
4.8.2 Red-shift	2.7b, c Red-shift	New: <ul style="list-style-type: none"><li>• dark matter</li><li>• observations of supernovae.</li></ul>
N/A	2.7a, d, e Red-shift	This content is no longer present in the new specification.