# PLANNING SUPPORT BOOKLET

**J249, J250**

**For first teaching in 2016**

This support material booklet is designed to accompany the OCR GCSE (9–1) specification in Physics A and Combined Science A (Gateway Science).

***DISCLAIMER***

This resource was designed using the most up to date information from the specification at the time it was published. Specifications are updated over time, which means there may be contradictions between the resource and the specification, therefore please use the information on the latest specification at all times.If you do notice a discrepancy please contact us on the following email address: resources.feedback@ocr.org.uk

# Introduction

This support material is designed to accompany the OCR GCSE (9-1) specification in Physics A (Gateway) for teaching from September 2016.

The Planning Guidance table on the following pages sets out *suggested* teaching times for the topics within the specification. Note that we always recommend that individual centres plan their schemes of work according to their individual needs. Actual teaching times for topics will depend on the amount of practical work done within each topic and the emphasis placed on development of practical skills in various areas, as well as use of contexts, case studies and other work to support depth of understanding and application of knowledge and understanding. It will also depend on the level of prior knowledge and understanding that learners bring to the course.

The table follows the order of the topics in the specification. It is not implied that centres teach the specification topics in the order shown, centres are free to teach the specification in the order that suites them.

## Delivery guides

The column ‘Delivery guides’ refers to individual teacher guides available from the GCSE Physics A qualification page.

These Delivery guides provide further guidance and suggestions for teaching of individual topics, including links to a range of activities that may be used and guidance on resolving common misconceptions.

## Practical Work

Specification topic p9 (Practical skills) is not included explicitly in the Planning Guidance table. The expectation is that the practical skills are developed throughout the course and in support of conceptual understanding.

Suggestions for where the PAG techniques can be are included throughout the table. This is by no means and exhaustive list of potential practical activities.

| **Topic** | **Teaching hours**separate / combined | **Delivery Guides** | **PAG opportunities** |
| --- | --- | --- | --- |
| **Topic 1: Matter** |
| 1.1 The particle model | 3 / 3 hours | Matter – delivery guide | PAG1: Determine the densities of a variety of objects both solid and liquid  |
| 1.2 Changes of state | 5 / 5 hours | Matter – delivery guide | PAG5: Determine the specific heat capacity of a metal (Activity 1)PAG5: Kettle design (Activity 2) |
| **1.3 Pressure (separate science only)** | 6 / 0 hours | Matter – delivery guide |  |
| **Total for topic 1 = 14 / 8 hours** |
| **Topic 2: Forces** |
| 2.1 Motion | 5 / 5 hours | Forces and Motion – delivery guide | PAG3: Investigate acceleration of a trolley down a ramp (Activity 1)PAG3: Investigating fluid flow (Activity 2) |
| 2.2 Newton’s laws | 12 / 11 hours | Forces and Motion – delivery guide |  |
| 2.3 Forces in action | 8 / 4 hours | Forces and Motion – delivery guide | PAG 2: Investigate the effect of forces on springs (Activity 1)PAG 2: Investigating the effects of forces on the compression of a sample (Activity 2) |
| **Total for topic 2 = 25 / 20 hours** |
| **Topic 3 Electricity** |
| 3.1 Static and Charge | 4 / 3 hours | Electricity – delivery guide |  |
| 3.2 Simple circuits | 7 / 7 hours | Electricity – delivery guide | PAG6: Investigate the I-V characteristics of circuit elements (Activity 1)PAG6: Mystery circuit elements (Activity 2)PAG7: Investigate the brightness of bulbs in series and parallel |
| **Total for topic 3 = 11 / 10 hours** |
| **Topic 4 Magnetism** |
| 4.1 Magnets and magnetic fields | 5 / 5 hours | Magnetism – delivery guide |  |
| 4.2 Uses of magnetism | 8 / 2 hours | Magnetism – delivery guide |  |
| **Total for topic 4 = 13 / 7 hours** |
| **Topic 5 Waves** |
| 5.1 Wave behaviour | 7 / 4 hours | Waves – delivery guide | PAG4: Measuring the speed, frequency and wavelength of a wave (Activity 1)PAG4: Tsunami (Activity 2)PAG4: Measuring the speed, frequency and wavelength of a wave |
| 5.2 The electromagnetic spectrum | 4 / 4 hours | Waves – delivery guide |  |
| 5.3 Wave interactions  | 5 / 1 hours | Waves – delivery guide | PAG8: Investigate the reflection of light off a plane mirror and the refraction of light through prisms (Activity 1)PAG8: Reflection within a material (Activity 2) |
| **Total for topic 5 = 16 / 9 hours** |
| **Topic 6 Radioactivity** |
| 6.1 Radioactive emissions | 6 / 6 hours | Radioactivity – delivery guide |  |
| 6.2 Uses and Hazards  | 5 / 1 hours | Radioactivity –delivery guide |  |
| **Total for topic 6 = 11 / 7 hours** |
| **Topic 7 Energy** |
| 7.1 Work done | 5 / 5 hours | Energy – delivery guide |  |
| 7.2 Power and efficiency | 6 / 6 hours | Energy – delivery guide |  |
| **Total for topic 7 = 11 / 11 hours** |
| **Topic 8 Global Challenges** |
| 8.1 Physics on the move | 5 / 4 hours | Global challenges – delivery guide |  |
| 8.2 Powering Earth | 6 / 5 hours | Global challenges – delivery guide |  |
| **8.3 The Earth and beyond (separate science only)** | 8 / 0 hours | Global challenges – delivery guide |  |
| **Total for topic 8 = 19 / 9 hours** |
| **Total teaching hours = 120 / 81 hours** |

🗹 This symbol indicates content that is found only in the physics separate science qualification.

# Outline Scheme of Work: P1 – Matter

## Total suggested teaching time – 14 hours

### P1.1 The particle model (3 hours)

|  |
| --- |
| Links to KS3 Subject content* a simple (Dalton) atomic model
* differences between atoms, elements and compounds
* chemical symbols and formulae for elements and compounds
* similarities and differences, including density differences, between solids, liquids and gases
* the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition
* atoms and molecules as particles
 |
| Links to Mathematical Skills* M1a
* M1b
* M1c
* M3c
* M5b
 | Links to Practical Activity Groups (PAGs)* PAG 1: Determine the densities of a variety of objects both solid and liquid
 |

# Overview of P1.1 The particle model

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 (1hr for separate and combined) | P1.1a describe how and why the atomic model has changed over timeP1.1b describe the atom as a positively charged nucleus surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with almost all of the mass in the nucleusP1.1c recall the typical size (order of magnitude) of atoms and small molecules | Starter options: Thompson’s plum pudding model of the atomA clip just over 2 minutes in length summarising Thompson’s plum pudding model.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294505#294505)**Main options:** Facebook activityGeneral template that learners can use to represent any historical figure. This can be used for the scientists involved in the development of the atomic structure.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294507#294507) Resources to develop a learner timeline 1A research link for learners to find information about the development of the atomic model. This can be used to make a timeline.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294513#294513)Visualising the size of an atom and small moleculesThis short instruction sheet provides teachers with ideas to use in the classroom that will enable learners to better visualise the sizes of atoms.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294509#294509)Plenary options: Discovering the nucleusThree levelled worksheets based on Geiger and Marsden’s experiments. They take the learners through the practical and the results and ask a range of questions to follow.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294517#294517) Geiger and Marsden’s experimentAn animation to allow learners to be guided through the experiment and to check their understanding.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294519#294519) | Link to Delivery guide Matter<http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf>Link to transition guide Matter<http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf> |
| 2(1hr for separate and combined) | P1.1d define densityP1.1e explain the differences in density between the different states of matter in terms of the arrangements of the atoms and moleculesP1.1f apply the relationship between density, mass and volume to changes where mass is conserved (M1a, M1b, M1c, M3c)PM1.1i recall and apply: density (kg/m3) = mass (kg) / volume (m3) | Starter: Density: A story of Archimedes and the gold crownA video summarising the story of Archimedes and the gold crown which is a good introduction to getting learners thinking about density and its relationship with mass and volume.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294521#294521)Main options: Density experimentsNumerous free videos and experiment sheets for density experiments that can be printed straight from the website and used for whole class practical activities.[View full activity in 1.1 The particle model - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg001-p11-the-particle-model?activity=294511#294511)**Plenary**: Question 19 Paper 1 Foundation tier [SAM](http://www.ocr.org.uk/Images/234625-unit-j249-01-physics-foundation-tier-paper-1-sample-assessment-material.pdf) | Link to Delivery guide [Matter](https://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](https://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf)Link to SAM [J249-01](https://www.ocr.org.uk/Images/234625-unit-j249-01-physics-foundation-tier-paper-1-sample-assessment-material.pdf) |
| 3(1hr for separate and combined) | P1.1d define densityP1.1e explain the differences in density between the different states of matter in terms of the arrangements of the atoms and moleculesP1.1f apply the relationship between density, mass and volume to changes where mass is conserved (M1a, M1b, M1c, M3c)PM1.1i recall and apply: density (kg/m3) = mass (kg) / volume (m3) | **Starter:** How to calculate the density of a person<https://www.youtube.com/watch?v=druZDtSK1-U>**Main:** PAG 1: Determining Densities**Plenary**: Give pupils the [candidate progress sheet](https://www.ocr.org.uk/Images/295647-gcse-physics-learner-record-sheet.doc), from the practical activities section of the webpage. Pupils to tick of skills covered.  | Link to PAG activity:[PAG P1](https://www.ocr.org.uk/Images/293854-pag-activity-physics-materials-suggestion-1.docx) – Determining Densities can be found in the Practical activities section of the subject page.Link to [candidate progress sheet](https://www.ocr.org.uk/Images/295647-gcse-physics-learner-record-sheet.doc)  |

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| Additional online learning opportunities***As a response to the Covid-19 outbreak, additional online learning opportunities were identified for each topic in June 2020.*** |
| Lesson | Statement | Teaching activities |
| 1 | P1.1a, P1.1b | PhET[Animation](https://phet.colorado.edu/en/simulation/rutherford-scattering) for Thomson and Rutherford experiments which can be used to reinforce understanding or to replace the 2nd plenary task. |
| 1 | P1.1a, P1.1b | Brian Cox [video](https://www.youtube.com/watch?v=-FWxd78sOZ8) on the model of the atom can be used as a Main activity or flipped learning. Rutherford scattering is from 4.14-4.55. |
| 2 | P1.1d, P1.1e, P1.1f | Cambridge International [video](https://ocr.org.uk/rpgphys1) explaining how density is calculated for an irregular shaped object and a liquid. This can be shown to students before attempting the experiments themselves. |
| 3 | P1.1d, P1.1e, P1.1f | Past paper [density questions](https://ocr.org.uk/Images/244398-question-paper-unit-b752-02-modules-p4-p5-p6-higher-tier.pdf) and [markscheme](https://www.ocr.org.uk/Images/240386-mark-scheme-unit-b752-02-modules-p4-p5-p6-higher-tier-june.pdf) that can be used by students for homework to consolidate and apply their knowledge. Go to Q15.  |

# Outline Scheme of Work: P1 – Matter

## Total suggested teaching time – 14 hours

### P1.2 Changes of state (5 hours)

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| Links to KS3 Subject content* conservation of mass changes of state and chemical reactions
* changes of state in terms of the particle model
* conservation of material and mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving
* the difference between chemical and physical changes
* changes with temperature in motion and spacing of particles
* internal energy stored in materials
 |
| Links to Mathematical Skills* M1a
* M3c
* M3d
 | Links to Mathematical Skills* M1a
* M3c
* M3d
 |

# Overview of P1.2 Changes of state

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1(1hr for separate and combined) | P1.2a describe how mass is conserved when substances melt, freeze, evaporate, condense or sublimateP1.2b describe that these physical changes differ from chemical changes because the material recovers its original properties if the change is reversed | Starter: Sublime iodineA short video clip showing the sublimation of iodine.[View full activity in 1.2 Changes of state - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg002-p12-changes-of-state?activity=294561#294561)**Main:** Melting and freezing stearic acid practical<http://www.rsc.org/learn-chemistry/resource/res00001747/melting-and-freezing-stearic-acid?cmpid=CMP00005262>**Plenary:** Pupils to write definitions of the key term: Melt, freeze, evaporate, condense and sublimate. | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf) |
| 2(1hr for separate and combined) | P1.2c describe how heating a system will change the energy stored within the system and raise its temperature or produce changes of state | Starter: video changing state<https://www.youtube.com/watch?v=v4zq_uTl7Ho>Main: Probing for learners understandingThis is a website to assist teachers new to delivering some of the concepts in this topic.[View full activity in 1.2 Changes of state - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg002-p12-changes-of-state?activity=294575#294575)Practical and graph for heating curve of ice – water ­– steam<http://www.kentchemistry.com/links/Matter/HeatingCurve.htm>**Plenary:** Pupils annotate a heating graph to show where changes of states occur. Pupils answer the question: Why does the temperature stay the same during a change of state? | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf) |
| 3(1hr for separate and combined) | P1.2d define the term specific heat capacity and distinguish between it and the term specific latent heatP1.2e apply the relationship between change in internal energy of a material and its mass, specific heat capacity and temperature change to calculate the energy change involved (M1a, M3c, M3d)PM1.2i apply: change in thermal energy (J) = mass (kg) x specific heat capacity (J/kg°C) x change in temperature (°C) | Starter: Specific heat capacity videoA short video showing what specific heat capacity is and how it can be calculated.[View full activity in 1.2 Changes of state - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg002-p12-changes-of-state?activity=294563#294563)Main: Practical – specific heat capacity of water<http://www.instructables.com/id/Measure-the-specific-heat-of-water-and-other-fluid/>Plenary Options: Specific heat capacity puzzleLearners should work in small groups with one complete set of cards. The aim is to answer the questions using the information given.[View full activity in 1.2 Changes of state - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg002-p12-changes-of-state?activity=294567#294567)[SAM](http://www.ocr.org.uk/Images/234625-unit-j249-01-physics-foundation-tier-paper-1-sample-assessment-material.pdf) question 22 J249-01 F | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf)Link to SAM [J249-01](http://www.ocr.org.uk/Images/234625-unit-j249-01-physics-foundation-tier-paper-1-sample-assessment-material.pdf) |
| 4(1hr for separate and combined) | P1.2d define the term specific heat capacity and distinguish between it and the term specific latent heatP1.2e apply the relationship between change in internal energy of a material and its mass, specific heat capacity and temperature change to calculate the energy change involved (M1a, M3c, M3d)PM1.2i apply: change in thermal energy (J) = mass (kg) x specific heat capacity (J/kg°C) x change in temperature (°C) | **Starter:** Demo PAG apparatus**Main:** PAG 5: Determining the specific heat capacity of a metal**Plenary**: Give pupils the [candidate progress sheet](https://www.ocr.org.uk/Images/295647-gcse-physics-learner-record-sheet.doc), from the practical activities section of the webpage. Pupils to tick of skills covered.  | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf)PAG 5[PAG P5](https://www.ocr.org.uk/Images/309692-pag-activity-physics-energy-suggestion-1.docx) – Determining the specific heat capacity of a metal |
| 5(1hr for separate and combined) | P1.2d define the term specific heat capacity and distinguish between it and the term specific latent heatP1.2f apply the relationship between specific latent heat and mass to calculate the energy change involved in a change of state (M1a, M3c, M3d)PM1.2ii apply: thermal energy for a change in state (J) = mass (kg) x specific latent heat (J/kg) | Starter: Introduction to specific latent heat<https://www.youtube.com/watch?v=SzNAoyIGUeA>Main: Latent heat of fusion of iceA downloadable document covering a practical that can be carried out with a class to determine the specific latent heat of ice.[View full activity in 1.2 Changes of state - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg002-p12-changes-of-state?activity=294551#294551) **Plenary options:**Specific heat capacity and latent heat: Cyber physics Resources: [http://www.cyberphysics.co.uk/Q&A/KS4/SHC/questionsSHC\_GCSE.html](http://www.cyberphysics.co.uk/Q%26A/KS4/SHC/questionsSHC_GCSE.html)A series of exam based questions which learners can use to apply their equations. The questions include solutions and a quick explanation about each key area. Many other topics can also be found.Specific latent heat worksheetExample questions for specific latent heat.<https://www.tes.com/teaching-resource/specific-latent-heat-calculations-11332549> | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf)Note: Question 4 answer is 1130 000 J |

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| Additional online learning opportunities***As a response to the Covid-19 outbreak, additional online learning opportunities were identified for each topic in June 2020.*** |
| Lesson | Statement | Teaching activities |
| 2 | P1.2c P1.2f | This [colourful online video](https://www.youtube.com/watch?v=3itqmCtmJPc) can be used in place of the practical and graph video for heating curve of ice – water – steam. |
| 3 | P1.2c, P1.2d, P1.2ePM1.2i | [Video](https://www.youtube.com/watch?v=HAPmwu7byGM) on the specific heat capacity experiment including a discussion on possible errors.This can be used as a main activity or flipped learning activity before students carry out the experiment themselves. |

# Outline Scheme of Work: P1 – Matter

## Total suggested teaching time – 14 hours

### P1.3 Pressure (6 hours)

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| --- |
| Links to KS3 Subject content* Atmospheric pressure, decreases with increase of height as weight of air above decreases with height
* Pressure in liquids, increases with depth; upthrust effects, floating and sinking
* Pressure measured by ratio of force over area – acting normal to any surface
 |
| Links to Mathematical Skills* M1c
* M3c
* M4a
* M5b
 | Links to Mathematical Skills* M1c
* M3c
* M4a
* M5b
 |

# Overview of P1.3 Pressure

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1(1hr for separate and combined) | P1.3a explain how the motion of the molecules in a gas is related both to its temperature and its pressureP1.3b explain the relationship between the temperature of a gas and its pressure at constant volume (qualitative only) 🗹PM1.3i apply: for gases: pressure (Pa) x volume (m3) = constant (for a given mass of gas and at a constant temperature) 🗹 | Starter: Boyle’s law animation (Pressure x volume = a constant)This is a learner revision site; however the animation is really helpful to introduce the concept of Boyle’s law.[View full activity in 1.3 Pressure - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg003-p13-pressure?activity=294612#294612)**Main options:** The physics hyper textbookUseful mini practical’s that can be completed very simply to demonstrate what happens during changes in volume creating a temperature change.[View full activity in 1.3 Pressure - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg003-p13-pressure?activity=294619#294619)Gas laws learner activityA website link which takes you to a virtual gas lab where temperature and pressure can be altered.[View full activity in 1.3 Pressure - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg003-p13-pressure?activity=294621#294621)**Plenary:** Give pupils examples of systems and ask them what will happen to the pressure if you increase/decrease the temperature/volume  | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf) |
| 2 (1hr separate only) | P1.3c recall that gases can be compressed or expanded by pressure changes and that the pressure produces a net force at right angles to any surface🗹PM1.3i apply: for gases: pressure (Pa) x volume (m3) = constant (for a given mass of gas and at a constant temperature) 🗹 | Starter: Gas laws <https://www.youtube.com/watch?v=oZqBBmqqWo8>Main options: Pressure: MetLink Resources: <http://www.metlink.org/experimentsdemonstrations/>A number of class practicals and demos which will help learners understand pressure in a practical way. There are other teaching resources available as well.Physics fact sheet 99Some gas law practicals. The majority of these are at AS level, however the Boyle’s law experiment is helpful.[View full activity in 1.3 Pressure - Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-physics-a-j249-from-2016/delivery-guide/topic-gpat001-p1-matter/delivery-guide-gpadg003-p13-pressure?activity=294617#294617)**Plenary:** [SAM](http://www.ocr.org.uk/Images/234636-unit-j259-04-depth-in-physics-higher-tier-sample-assessment-material.pdf) question 7a J259-04 | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf)Link to SAM question 7 [J259-04](http://www.ocr.org.uk/Images/234636-unit-j259-04-depth-in-physics-higher-tier-sample-assessment-material.pdf) |
| 3(1hr separate only) | **P1.3e explain how doing work on a gas can increase its temperature**🗹 | Starter: Work done and temperature <https://www.youtube.com/watch?v=GVUpq2qFolM>Main: Measuring gas pressure using a manometerThis Nuffield [experiment](https://spark.iop.org/measuring-gas-supply-pressure#gref) on IOPSpark explores the use of a manometer to measure pressure in a column of liquid.**Plenary:** Pupils answer Lesson objective as question: What would the effect of doing work on a gas be on its temperature? Explain your answer. | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf) |
| 4(1hr separate only) | P1.3f describe a simple model of the Earth’s atmosphere and of atmospheric pressure🗹P1.3g explain why atmospheric pressure varies with height above the surface of the planet🗹 | Starter: Earth’s atmosphere: Knockhardy Resources: <http://www.knockhardy.org.uk/gcse_htm_files/gatmospps.pps>A good teaching PowerPoint which explains the earths atmospheric model and the composition of gases**Main Options:** Atmospheric pressure problemsQ2 and Q3 from this bitesize [test](https://www.bbc.co.uk/bitesize/guides/zt4trwx/revision/4). **The Goldilocks principle**: A model of atmospheric gasesLearners use jelly beans and coloured cotton wool to produce a model of Earth’s atmosphere. This can be completed as a comparison between Earth and the other ‘sister’ planets in a hands on way.[View full activity in 1.3 Pressure - Online delivery guide](http://www.mtscienceducation.org/toolkit-home/scientific-engineering-practices/developing-and-using-models/activity-4-the-goldilocks-principle-a-model-of-atmospheric-gases/?print=print)**Plenary:** Questions: In a hydraulic car braking system, why do we make the piston by the wheel bigger than the piston by the brake pedal? | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf) |
| 5(1hr separate only) | **P1.3h describe the factors which influence floating and sinking**🗹**P1.3i explain why pressure in a liquid varies with depth and density and how this leads to an upwards force on a partially submerged object**🗹**P1.3j calculate the differences in pressure at different depths in a liquid (M1c, M3c)** 🗹**PM1.3ii apply: pressure due to a column of liquid (Pa) = height of column (m) x density of liquid (kg/m3) x g (N/kg)** 🗹 | Starter: buoyancy <https://www.youtube.com/watch?v=nMlXU97E-uQ>Main: Up thrust, floatation and liquid pressureThis [video](https://www.youtube.com/watch?v=WYzy16nSy3Y) looks at upthrust, flotation and liquid pressure. Q2 from this [bitesize page](https://www.bbc.co.uk/bitesize/guides/zsdsk2p/revision/6) could be used for a group discussion or individual activity. **Plenary:** [SAM](http://www.ocr.org.uk/Images/234629-unit-j249-03-physics-higher-tier-paper-3-sample-assessment-material.pdf) question 18 J249-03 | Link to Delivery guide [Matter](http://www.ocr.org.uk/Images/283338-matter-delivery-guide.pdf)Link to transition guide [Matter](http://www.ocr.org.uk/Images/293467-matter-ks3-ks4-transition-guide.pdf)SAM [link](http://www.ocr.org.uk/Images/234629-unit-j249-03-physics-higher-tier-paper-3-sample-assessment-material.pdf) |
| 6 | Chapter P1 End of topic quiz | Pupils to complete the end of topic quiz P1. After completion pupils to swap and mark quizzes.Pupils use their quizzes to create a revision list from Chapter 1. | End of chapter [quiz P1](https://www.ocr.org.uk/qualifications/gcse/gateway-science-suite-physics-a-j249-from-2016/planning-and-teaching/#gcse-teaching-activities), in teaching activities tab. |

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| Additional online learning opportunities***As a response to the Covid-19 outbreak, additional online learning opportunities were identified for each topic in June 2020.*** |
| Lesson | Statement | Teaching activities |
| 1-2 | P1.3a, P1.3d | [Worksheet](https://www.tes.com/teaching-resource/boyle-s-law-questions-for-gcse-11369938) on the relationship between pressure and volume of a gas can be used as homework. |
| 3 | P1.3a, P1.3b, P1.3cP1.3d | Bitesize [MCQ quiz](https://www.bbc.co.uk/bitesize/guides/zwvd6yc/test) which can be used as a plenary (or homework) at end of lesson 3.  |
| 4 | P1.3f, P1.3g | Cambridge International [video](https://ocr.org.uk/rpgphys2) showing the collapsing can experiment which can be used as a starter activity or flipped learning to introduce atmospheric pressure. |
| 4 | P1.3f, P1.3g | An alternative air pressure [PowerPoint](https://www.tes.com/teaching-resource/air-pressure-12069845) which could be used to introduce the topic e.g. as flipped learning.  |
| 4 | P1.3f, P1.3g | Q5a from Cambridge International [past paper](https://ocr.org.uk/rpgphys3) and ms that could be used as a plenary activity and peer review, or homework. |
| 1-5 | P1.3 | [Teaching and Learning toolbox](https://sciencetltoolkit.wordpress.com/2016/11/08/top-10-pressure-demos-and-videos-for-the-new-gcse-2/) has lots of videos and activities which can be used for flipped learning for section 1.3. |
| 5 | P1.3iPM1.3ii | This PhET [animation](http://phet.colorado.edu/sims/html/under-pressure/latest/under-pressure_en.html) can be used to investigate the relationship between pressure, the depth and density of a liquid and gravitational field strength.The pressure gauge can be dragged to give a reading for pressure at different depths. |



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