# Scheme of Work Support

This document is intended to help departments finalise, augment or generate fresh schemes of work for the new Geology qualifications.

* [OCR AS Geology H014](http://www.ocr.org.uk/Images/322106-specification-accredited-as-level-gce-geology-h014.pdf)
* [OCR A Level Geology H414](http://www.ocr.org.uk/Images/322105-specification-accredited-a-level-gce-geology-h414.pdf)

### Contents

* A full ‘cut and paste-able’ list of the learning outcomes in modules 2–7 (Geology H414). Please refer to the specification for important ‘Additional guidance’ on each learning outcome when preparing to teach the content.
* Indicative teaching hours for each sub-topic:
1. in terms of total teacher contact time required including initial lesson time when teaching the content for the first time, assessment and revision (i.e. the Guided Learning Hours concept – which sums to 180h in each year).
2. the shorter time expected to be required just for the initial lesson time (useful for SoW planning).
* An example scheme of work for the first half term of teaching the new Geology course, generated using the [online Delivery Guides](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414292) and [Scheme of Work Builder](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/scheme-of-work-builder/) which can be accessed through the Geology subject page

### Introduction

All this material is for information only. It is intended as a resource that you may find useful as a starting point or as a ‘double-check’ against what you already have. If you don’t find it useful please don’t use it and if you disagree with the suggested teaching times please go with your own judgement and experience. Sometimes it is useful to have somebody else’s opinion if only to crystallise your own.

There are so many different ways in which A Level Geology timetabling and teaching is structured in different schools and colleges that it is impossible to produce even a suggestion for a Scheme of Work for all circumstances.

To use the online scheme of work builder for the geology specification click the link below:

[www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/scheme-of-work-builder/](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/scheme-of-work-builder/)

On the following pages a number of alternative approaches to teaching the AS and A Level Geology course are summarised. The guidance follows the order of the specification. It is not necessarily implied or recommended that centres teach the specification in the order show here.

### Delivery guides

In the Subtopic column ‘Delivery guides’ refers to individual teacher guides available from the OCR online Delivery Guide, accessed from the [subject page](https://ocr.org.uk/qualifications/as-a-level-gce/geology-h014-h414-from-2017/). These Delivery guides provide a significant source of 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

Module 1.1 (Practical skills assessed in a written examination) is not included explicitly in the guidance below. The expectation is that practical skills are developed through the practical work done throughout the course and in support of conceptual understanding.

Suggestions for suitable practical work are included throughout this document. There is also detailed advice on planning your practical scheme of work in the [Practical Skills Handbook](https://www.ocr.org.uk/Images/461085-practical-skills-handbook.pdf) which provides a more detailed list of potential practical activities.

In the guidance, the abbreviation ‘PAG’ stands for ‘Practical Activity Group’, and refers to the groups defined in Appendix 5g of the A Level specification (H414). These PAGs form part of the Practical Endorsement in Geology, which is part of the A Level qualification only. There is no internally assessed practical assessment in the AS qualification. However, practical skills will be assessed in the written examinations at both AS and A Level. All PAG activities are available at the OCR Interchange website: Click *Coursework and tasks / Science Co-ordinator materials / GCE AS/A2 Upto 2015*. If you do not have access to these pages, please speak with your centre’s Exams Officer.

AS learners will benefit from taking part in the practical activities, and will be able to count their performance (as long as adequate records are kept) towards the A Level Practical Endorsement if they decide to proceed to the full A Level after taking the AS examinations. OCR recommends that AS learners join in with any Practical Endorsement activities undertaken in the first year of the A Level course.

The ‘PAG’ references in the guidance indicate topics where completion of individual PAGs would support teaching of the content. It is not compulsory to complete PAGs at these points.

### Assessment resources

[Exemplar candidate responses](https://ocr.org.uk/Images/413807-exemplar-learner-responses-to-level-of-response-questions.pdf) to Level of Response marked questions at AS and A level may be used to inform teaching or as a learning resource. A wide range of end of topic quizzes (which contain some multiple choice questions) are available to download from the Science Co-ordinator area on OCR Interchange. In addition to the Sample Assessment Materials there are [past paper resources](https://interchange.ocr.org.uk/Downloads/AS_Past_Paper_Geology_v2.zip) on the subject page which contains H087/H487 past paper items and mark schemes mapped to the H414/H014 specification.

### Feedback

If you have any comments or questions, please contact the Subject Team at ScienceGCE@ocr.org.uk

# Possible Programmes of Study

The exemplars have been prepared for a fictitious department where each A Level class has just one teacher and has two double lessons and one single lesson each week. Alternatively there could be a 6:4 split between two teachers of one teacher teaching the AS level over two years.

|  |  |  |  |
| --- | --- | --- | --- |
| **Term** | **Single Teacher** | **Two Teachers** | **Two year AS** |
| **Year 1 Autumn** | 2.1 Minerals & Rocks | 2.1.1, 2.1.2 & 2.1.43.2.1 | 3.1.13.1.22.1.3 | 2.1 Minerals & Rocks2.2 Fossils |
| 2.2 Fossils,3.1 Earth structure & 3.2.1 |
| **Year 1 Spring** | 3.2 Plate Tectonics & 3.3 Geological Structures | 3.2.13.2.23.3.1 | 2.2.12.2.24.2.1 | 3.1 Earth structure3.2.1 Plate tectonic paradigm |
| 4.1 Sedimentary environments in time  |
| **Year 1 Summer** | 4.2 GeochronologyAS EXAM | 3.3.2AS EXAM5.3.1,5.3.2 & 5.4.1 | 4.1.1AS EXAM4.1.2 | 3.2.2 Igneous processes3.3 Geological Structures |
| 5.3 Igneous petrology5.4 Metamorphic petrology |
| **Year 2 Autumn** | 5.1 Applied sedimentology, 5.2 Fluids & 5.5 Mining | 5.5.1 & 5.5.26.1.1, 6.1.2 & 6.1.3 | 5.1.1 & 5.2.17.1.1, 7.1.2 & 7.1.3 | 4.1 Sedimentary environments in timeFieldtrip |
| 6.1 Geohazards6.2.1 Geotechnics |
| **Year 2 Spring** | 6.2.2 Engineering geology7.1 Basin analysis concepts | 6.2.1 & 6.2.2Revision | 7.2.17.2.27.2.3 | 4.2 Geochronology |
| 7.2 Basin analysis in practice | Revision |
| **Year 2 Summer** | Revision | Revision | Revision | AS EXAM |
| AL Exams | AL Exams | AL Exams |  |

### Geology Learning Outcomes

| **Module** | **Topic** | **Subtopic** | **Indicative hours** | **Learning outcome** |
| --- | --- | --- | --- | --- |
| **Total teacher contact** | **Initial lesson time** |
| 2: Foundations in geology  | 2.1 Minerals and rocks | 2.1.1 Minerals[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211) | 13 | 10 | (a) minerals as naturally occurring elements and inorganic compounds whose composition can be expressed as a chemical formula |
| (b) rock-forming silicate minerals as crystalline materials built up from silicon–oxygen tetrahedra to form frameworks, sheets or chains and which may have a range of compositions (qualitative only) |
| (c)(i) the diagnostic physical properties of rock-forming minerals in hand specimens |
| (c)(ii) the classification of samples, photographs and thin section diagrams of minerals using their diagnostic physical properties |
| (c)(iii) practical investigations to determine the density and hardness of mineral samples(c)(iv) the techniques and procedures used to measure mass, length and volume |
| (d) the classification of rocks, which are made up of one or more minerals, as igneous, sedimentary or metamorphic using their relationship to temperatures and pressures in the rock cycle |
| 2.1.2 Igneous rocks[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02b-rocks-and-minerals-igneous-rocks-212) | 11 | 7 | (a)(i) the classification of igneous rocks on the basis of their composition (silicic, intermediate, mafic and ultramafic) and crystal grain size (coarse-crystals >5 mm diameter; medium-crystals 1–5 mm diameter; fine-crystals <1 mm diameter) |
| (a)(ii) the diagnostic properties of rocks to identify igneous rocks in samples, photographs and thin section diagrams |
| (b)(i) igneous textures, crystal shape and crystal size as evidence for depth of formation and rate of cooling of igneous rocks(b)(ii) the diagnostic properties of igneous textures and crystal shape in samples, photographs and thin section diagrams |
| (b)(iii) the representation using drawings and annotated diagrams of igneous textures and crystal shape in samples |
| (b)(iv) the techniques and procedures used to measure temperature |
| 2.1.3 Sedimentary rocks[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213) | 20 | 15 | (a) weathering and erosion, the mechanical, chemical and biological processes that produce the sediments that form sedimentary rocks |
| (b)(i) the effect of the process of erosion on the characteristics and composition of modern sediments |
| (b)(ii) sieve analysis of sediments |
| (c) the diagnostic properties of rocks to recognise and measure grain sizes in samples, photographs and thin section diagrams |
| (d)(i) the classification of siliciclastic rocks on the basis of their diagnostic properties (colour, composition, grain size and grain shape, sorting) |
| (d)(ii) the classification of carbonate rocks on the basis of their diagnostic properties (grain size, cement, mineral composition and fossil content, and sorting) |
| (d)(iii) the diagnostic properties of rocks to identify siliciclastic and carbonate rocks in samples, photographs and thin section diagrams |
| (e)(i) the processes of diagenesis and lithification: mechanical compaction |
| (e)(ii) the processes of diagenesis and lithification: chemical compaction by pressure dissolution and recrystallisation |
| (e)(iii) the processes of diagenesis and lithification: growth of cements |
| (e)(iv) the processes of diagenesis and lithification: how these changes in rock texture modify the porosity and permeability of rocks |
| 2.1.4 Metamorphic rocks[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02d-rocks-and-minerals-metamorphic-rocks-214) | 5 | 4 | (a) metamorphism as a solid state isochemical process that changes the characteristics of rock |
| (b) how the mineralogy and fabric of metamorphic rocks can be used to infer the composition of the parent rock |
| (c) how as the intensity of metamorphism changes different minerals form which can be used to reconstruct the conditions of metamorphism |
| 2.2 Fossils and  | 2.2.1 Fossils[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02e-fossils-and-time-fossils-221) | 7 | 7 | (a) fossils as the preserved remains of living organisms or the traces of those organisms |
| (b) the nature and the reliability of the fossil record and the morphological definition of species |
| (c)(i) the use and interpretation of fossils as palaeoenvironmental indicators: trace fossils to provide information on the behaviour of the organism that formed them and the palaeoenvironment |
| (c)(ii) the use and interpretation of fossils as palaeoenvironmental indicators: body fossils to provide information on the behaviour of the fossilised organism and the palaeoenvironment |
| 2.2.2 Geological time[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222) | 5 | 4 | (a) (i) the use of radioactive decay rates of the radionuclides in minerals to give a numerical age of those minerals and rocks  |
| (a) (ii) the plotting and interpretation of half-life curves  |
| (b) the geochronological division of the geological column for the Phanerozoic into eras and periods using a biostratigraphic relative time sequence. |
| 3: Global tectonics  | 3.1 Earth structure | 3.1.1 The physical structure of the Earth[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol03-module-3-global-tectonics/delivery-guide-ageol03a-earth-structure-the-physical-structure-of-the-earth-311) | 15 | 12 | (a) the layered structures of the Earth as defined by the rheological properties of the layers |
| (b) how the variation in P and S wave velocities provides indirect evidence to identify layers within the Earth and how their path through the Earth produces the P wave and S wave shadow zones |
| (c) the lithosphere as a rigid, brittle layer made of the crust and part of the upper mantle, which is divided into plates |
| (d) how evidence from gravity anomalies and isostasy provides indirect evidence to determine the behaviour of the lithosphere and asthenosphere |
| (e) how indirect evidence from electromagnetic (EM) surveys may be used to identify the lithosphere and asthenosphere at mid-ocean ridges |
| (f) the nature of the asthenosphere as a rheid, plastic layer with 1–5% partial melting |
| (g) how the density of the whole Earth and the rocks at the surface provide indirect evidence to infer the density of the core and mantle rocks |
| (h) the probable geodynamo origin of the Earth’s magnetic field which provides indirect evidence for the subdivision of the core |
| 3.1.2 The origin of the Earth’s structure[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol03-module-3-global-tectonics/delivery-guide-ageol03b-earth-structure-the-origin-of-the-earths-structure-312) | 13 | 9 | (a) the bulk composition of the Earth and how it is inferred from the composition of meteorites (chondrites) and the Sun |
| (b) a qualitative explanation of the nebular hypothesis for the formation of the solar system and the Earth |
| (c) the transfer of geothermal energy from:(i) heat of formation by the Earth(ii) radioactive decay within the Earth |
| (d) the Goldschmidt classification of elements into four groups and a qualitative understanding of the preferred formation of states of substances (oxides and sulfides) |
| (e) the differentiation of the Earth into layers of distinct composition and density by the partitioning of each of the Goldschmit groups between the crust, mantle, core, and atmosphere and hydrosphere |
| (f) the geochemical layered structure of the Earth as defined by the mineral composition of the layers and how the composition of these layers is inferred from direct evidence |
| 3.2 Plate tectonics | 3.2.1 The plate tectonics paradigm[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol03-module-3-global-tectonics/delivery-guide-ageol03c-plate-tectonics-the-plate-tectonics-paradigm-321) | 24 | 19 | (a) the transfer of energy from within the Earth which drives the Earth’s internal geological processes |
| (b)(i) the evidence from earthquake seismology data for the nature of lithospheric plates (aseismic interiors and margins defined by seismic activity) |
| (b)(ii) the evidence for structure in the mantle from seismic tomography data |
| (b)(iii) the interpretation and analysis of seismograms |
| (c) the nature of lithospheric plates: aseismic interiors and margins defined by seismic activity |
| (d) how the global distribution of geological features of the same age provides evidence to reconstruct historical plate movement |
| (e )the evidence for mantle plumes |
| (f) how the resolution and precision of the direct measurement of relative movement of points on different plates using global positioning systems (GPS) allow accurate measurement of the current relative movement of lithospheric plates |
| (g) subduction zones, lithospheric plates (cold thermal boundary) and mantle plumes which act as the active limbs of the convection cells which transfer energy from within the Earth |
| (h) how gravity and differences in density result in ridge push at mid-ocean ridges |
| (i) the relative importance of slab pull at subduction zones and ridge push at mid-ocean ridges as mechanisms driving the movement of tectonic plates |
| (j) how the plate tectonic paradigm emerged from previous, gradually more sophisticated models (geosynclines, continental drift, active mantle convection carrying passive tectonic plates); interpretation of these and other examples of such developing models |
| 3.2.2 Plate boundaries and igneous process[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol03-module-3-global-tectonics/delivery-guide-ageol03d-plate-tectonics-plate-boundaries-and-igneous-process-322) | 19 | 17 | (a) the generation of mafic magma by partial melting which results from upwelling of the mantle at divergent interplate margins and intraplate hot spot settings |
| (b) the generation of intermediate and silicic magmas at convergent interplate margins where crustal material is carried downward resulting in partial melting |
| (c) the processes of intrusion which cause a body of magma to ascend through the crust and how these affect the country rock |
| (d)(i) the characteristics of major and minor intrusive bodies and the settings under which they form |
| (d)(ii) the use of geodetic and geophysical data to identify the subsurface intrusion of magma |
| (e)(i) how changes in the properties of magma can affect buoyancy forces such that the magma can make its way to the surface producing a volcanic eruption |
| (e)(ii) practical investigations to model the properties of magma and how changes to conditions can affect buoyancy forces |
| (f) the diagnostic geological characteristics of dykes, sills and lava flows |
| (g) how the composition (percentage silica) and temperature of the erupting lava controls its viscosity and its ability to exsolve volatiles |
| (h) how the composition and physical characteristics of the erupted material control the volcanic landforms produced |
| (i) the nature of volcanic hazards and their relation to the composition and properties of the source magma |
| 3.3 Geological structures  | 3.3.1 Rock mechanics[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol03-module-3-global-tectonics/delivery-guide-ageol03e-geological-structures-rock-mechanics-331) | 13 | 9 | (a)(i) the geological structures produced by rock deformation as a result of tectonic stresses (tension, compression and shear forces) |
| (a)(ii) the identification, measurement and description of these geological structures on photographs, maps, cross-sections and in the field, including production of labelled field sketches |
| (a)(iii) the construction of geological cross-sections from geological maps |
| (a)(iv) use of a compass-clinometer |
| (b)(i) how tectonic stress and strain vary due to temperature, confining pressure and time, resulting in the plastic or brittle deformation of rocks |
| (b)(ii) the use of stress and strain diagrams |
| (c) how compressive forces can lead to the formation of a slaty cleavage. |
| 3.3.2 Structural geology and plate boundaries[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol03-module-3-global-tectonics/delivery-guide-ageol03f-geological-structures-structural-geology-and-plate-boundaries-332) | 7 | 6 | (a) how earthquakes occur when elastic strain energy stored in rocks is released (elastic rebound theory) |
| (b) how plate movement at conservative plate margins causes shear dominated tectonic environments, which can lead to rock deformation as a result of tectonic induced stresses |
| (c) how plate movement at convergent plate margins causes compressive and shear dominated tectonic environments, which can lead to rock deformation as a result of tectonic or gravity induced stresses |
| (d) how plate movement at divergent plate margins causes tensional dominated tectonic environments, which can lead to rock deformation as a result of tectonic or gravity induced stresses |
| 4: Interpreting the past | 4.1 Sedimentary environments in time | 4.1.1 Uniformitarianism and the rock cycle[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol04-module-4-interpreting-the-past/delivery-guide-ageol04a-sedimentary-environments-in-time-uniformitarianism-and-the-rock-cycle-411) | 5 | 4 | (a) the use of evidence in the field, photographs, diagrams and maps to recognise the rock cycle  |
| (b) how uniformitarianism and the rock cycle model developed over time, including ideas of catastrophism, mass extinctions, and changing conditions and rates of processes through geological time including the contributions of James Hutton and William Smith |
| (c) what facies associations are, why facies are the basic unit of sedimentary geology and how uniformitarianism is applied to the study of facies by analogy with modern sedimentary sequences and processes |
| 4.1.2 Surface processes and products[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol04-module-4-interpreting-the-past/delivery-guide-ageol04b-sedimentary-environments-in-time-surface-processes-and-products-412) | 16 | 15 | (a)(i) how the characteristics of the facies in a sedimentary environment are related to the methods of sediment transport |
| (a)(ii) the diagnostic sedimentary structures produced by the sediment transport processes |
| (a)(iii) the recognition, application and sketching of the diagnostic properties of sedimentary structures to interpret way-up and sedimentary environments, in the field and on photographs |
| (b) the construction and interpretation of graphic logs of modern sediment sequences and ancient sedimentary rock |
| (c) deposition in fluvial environments which produces a characteristic three-dimensional architecture due to lateral migration |
| (d) deposition in hot desert environments which are controlled by gradual aeolian processes and episodic high energy events |
| (e) deposition in shallow siliciclastic seas which produces characteristic offshore transitions from beach deposits, current reworked sand sheets to muds, below the wave base |
| (f) deposition in shallow carbonate seas which produces characteristic limestones within, on and outside the reef (reef limestone, bioclastic limestone and oolitic limestones) |
| (g) deposition in deep water carbonate seas above the carbonate compensation depth |
| 4.2 Geochronology | 4.2.1 Relative dating and biostratigraphy[Delivery Guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol04-module-4-interpreting-the-past/delivery-guide-ageol04c-geochronology-relative-dating-and-biostratigraphy-421) | 7 | 5 | (a) the geochronological principles used to place geological events in relative time sequences in outcrops, photographs, maps and cross-sections to interpret geological histories |
| (b) the critical application of lithostratigraphic correlation (lateral variation, diachronous beds) |
| (c) the application and limitations of relative dating |
| (d) biostratigraphic correlation using first appearance of macro fossils, stratigraphic range, extinction and fossil assemblages |
| 5: Petrology and economic geology  | 5.1 Applied sedimentology | 5.1.1 Sedimentary processes and resources[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 11 | 10 | (a)(i) the sedimentary processes which are infrequent and/or difficult to observe but can be understood and explained using scientific principles |
| (a)(ii) practical investigations to model the processes of sedimentation (to include formation of graded bedding, ripples and delta mouth switching) |
| (b) turbidity currents and how the Bouma turbidite model of deposition demonstrates the application of sedimentary principles |
| (c) how simple (topset, foreset and bottom set) and more complex deltaic cyclothem models demonstrate the application of sedimentary principles |
| (d) Walther’s law which relates vertical sequences in outcrop with the lateral facies changes seen in modern environments |
| (e) the deposition of banded iron-formations (BIFs) under the different atmospheric and ocean chemistry in the Palaeoproterozoic, as an example of a geological resource produced by sedimentary processes |
| 5.2 Fluids and geological processes | 5.2.1 Fluids in rocks[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 9 | 7 | (a)(i) how porosity controls the storage of fluids (water, oil and gas) in rocks |
| (a)(ii) how permeability controls the movement of fluids through rocks |
| (b) the application of Darcy’s law to model the flow of fluids in rocks |
| (c) the controls on groundwater quality which result from geochemistry (carbonates and sulfates), aquifer filtration and residence time |
| (d) the characteristics of subsurface geology which control the flow of groundwater (hydrogeology) including confined and unconfined aquifers, aquicludes, aquitards, the water table, piezometric surfaces and recharge zones |
| 5.3 Igneous petrology | 5.3.1 Igneous petrology[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 7 | 6 | (a)(i) the substitution of elements for others in the crystal structure of minerals and as magma cools and crystallises (olivine and plagioclase feldspar as examples of solid solution series) |
| (a) (ii) the interpretation of continuous and discontinuous binary phase diagrams |
| (b) the geological processes (assimilation, differentiation and fractionation) which cause magma composition to evolve and be modified |
| (c) the formation of layered intrusions and metal ores by magmatic differentiation, as an example of a geological resource produced by igneous processes |
| 5.3.2 Mid-ocean ridges[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 9 | 8 | (a)(i) the relationship between spreading rate and seabed morphology (water depth, fast and slow spreading mid-ocean ridges) |
| (a)(ii) the calculation of numerical age using radioactive decay rates |
| (b) the evidence for the internal structure and processes at mid-ocean ridges (ophiolite complexes and geophysical surveys: gravity, reflection seismic and geoelectrical) |
| (c) the formation of the oceanic crust, how mid-ocean ridges are formed, and the process of sea floor spreading at fast and slow spreading mid-ocean ridges |
| (d) hydrothermal processes at mid-ocean ridges and the formation of massive sulfide metal ores as an example of a geological resource produced by hydrothermal processes |
| 5.4 Metamorphic petrology | 5.4.1 Metamorphic petrology[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 9 | 7 | (a)(i) metamorphic grade and how the formation of different combinations of minerals can be used to reconstruct the conditions of metamorphism and infer the composition of the parent rock |
| (a)(ii) the plotting and interpretation of isograds to reconstruct conditions of metamorphism |
| (b)(i) the formation of metamorphic fabrics as a result of directed stress and time during mountain building (orogeny) and the use of fabrics to reconstruct conditions of metamorphism |
| (b)(ii) the diagnostic properties of metamorphic fabrics in samples, photographs and thin section diagrams |
| (c) how the composition of the parent rock and conditions (strain rate, temperature and pressure) at the time of rock deformation determine the nature of that rock deformation. |
| 5.5 Mining geology | 5.5.1 Exploration for metals[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 11 | 10 | (a) the low crustal abundances of metals and the concentration factors that produce economic ore deposits  |
| (b) the concentration of copper ore minerals by the processes of secondary enrichment as a result of chemical weathering and chemical reactions above and below the water table |
| (c) the concentration of ore in placer deposits in rivers and on beaches |
| (d) geophysical exploration techniques used to find metals (to include: magnetic, gravity and electromagnetic (EM) surveys) |
| (e) geochemical exploration methods used to find metals (to include analysis of: stream sediment, soil, water and vegetation samples) |
| (f) how existing data sets and follow-up surveys are integrated in geological prospecting, resource exploration and in defining the reserves |
| 5.5.2 Resource extraction and impacts[Delivery Guide](https://www.ocr.org.uk/Images/469188-module-5-petrology-and-economic-geology.docx) | 7 | 6 | (a) the principles, economics and sustainability of surface and underground mining operations: open pit, stope and longwall retreat techniques, phased development and life cycle of a mining development |
| (b) the principles, economics and sustainability of mineral processing operations |
| (c) the causes and management of contaminated minewater, a source of pollution, from abandoned coal mines and metal ore mines |
| (d) the geological controls on the use of former underground resource operations as repositories for the storage of waste products |
| 6: Geohazards | 6.1 Geohazards | 6.1.1 Earthquake geology[Delivery Guide](https://www.ocr.org.uk/Images/469355-module-6-geohazards.docx) | 9 | 7 | (a) the factors which affect the impact of earthquakes (to include: the absorption and attenuation of energy as seismic waves travel through the Earth, moment magnitude, the Mercalli intensity scale) |
| (b)(i) the interaction of the transmission of seismic energy and the competence of the bedrock / soil |
| (b)(ii) the interaction of groundwater with seismic waves (liquefaction) |
| (c) how civil engineering can reduce the impact of future seismic events |
| (d) the limitations and utility of seismic hazard risk analysis which synthesises and summarises geological data sets to communicate this information for the use of non-specialists |
| 6.1.2 Geohazard risk analysis[Delivery Guide](https://www.ocr.org.uk/Images/469355-module-6-geohazards.docx) | 9 | 7 | (a)(i) the effectiveness and limitations of probabilistic forecasting |
| (a)(ii) the calculation of probability and return periods from an annual maximum time series (of geological events) |
| (a)(iii) the appropriate communication of probability and return periods for the use of non-specialists |
| (b) the effectiveness and limitations of deterministic predictions of tectonic geohazards |
| (c) the use of geographical information systems (GIS) to synthesise and summarise geological and geographic data to improve disaster planning and communication of information |
| 6.1.3 Geohazards in the British Isles[Delivery Guide](https://www.ocr.org.uk/Images/469355-module-6-geohazards.docx) | 9 | 7 | (a)(i) shrinking and swelling clays: the causes of physical and geochemical changes to these clays in excavations and the forces generated by the interaction of these clays with groundwater |
| (a)(ii) shrinking and swelling clays: the effects of shrinking and swelling clays on structures and the application of engineering geology to mitigate these effects |
| (b) the causes and effects of subsidence and the application of engineering geology to mitigate these effects |
| (c) the causes and management of contaminated minewater, a source of pollution, from abandoned coal mines and metal ore mines |
| (d) the geological evidence for significant tsunamis in the recent geological past, their causes and the risk of future events |
| 6.2 Engineering geology | 6.2.1 Geotechnics[Delivery Guide](https://www.ocr.org.uk/Images/469355-module-6-geohazards.docx) | 11 | 8 | (a)(i) the effect of the interlocking and cementation of component minerals on rock strength |
| (a)(ii) the measurement of rock strength under compression and under shear |
| (a)(iii) the density of rocks |
| (b) how the strength of rocks and sediments is changed by weathering, fracture density and geological structures |
| (c) how the strength of rocks and sediments is changed by hydrostatic pressure (pore water) |
| (d) how existing data sets and ground investigations are integrated in a geotechnical site assessment |
| 6.2.2 Applied engineering geology[Delivery Guide](https://www.ocr.org.uk/Images/469355-module-6-geohazards.docx) | 13 | 11 | (a)(i) tunnelling as an example of a major civil engineering activity which impacts the natural and built environment: how engineering geology is applied to the construction of tunnels through both hard rock and unconsolidated material |
| (a)(ii) tunnelling as an example of a major civil engineering activity which impacts the natural and built environment: the application of engineering geology to monitor and mitigate the impacts of tunnelling |
| (b)(i) dams as an example of a major civil engineering activity with multiple geological impacts on the natural environment: how engineering geology is applied to the construction of dams |
| (b)(ii) dams as an example of a major civil engineering activity with multiple geological impacts on the natural environment: the application of engineering geology to monitor and mitigate the hydrogeological impact of dams |
| (b)(iii) dams as an example of a major civil engineering activity with multiple geological impacts on the natural environment: the application of engineering geology to monitor and mitigate the impact of dams on slope stability |
| (b)(iv) dams as an example of a major civil engineering activity with multiple geological impacts on the natural environment: the application of engineering geology to monitor and mitigate the impact of dam-impounded reservoirs on seismic activity |
| (c) the role of geological understanding in the management and remediation of contaminated land and groundwater, a source of pollution, such as former industrial brownfield sites |
| 7: Basin analysis | 7.1 Key concepts for basin analysis | 7.1.1 The changing Earth[Delivery Guide](https://www.ocr.org.uk/Images/469410-module-7-basin-analysis.docx) | 11 | 9 | (a)(i) how the Earth has changed through geological time (with particular focus on the Phanerozoic Eon): the changes in the distribution of continents from the Neoproterozoic – refer to 3.2.1 |
| (a)(ii) how the Earth has changed through geological time (with particular focus on the Phanerozoic Eon): the long term changes in the Earth’s climate and composition of the atmosphere |
| (a)(iii) how the Earth has changed through geological time (with particular focus on the Phanerozoic Eon): the long term changes in global sea level |
| (a)(iv) how the Earth has changed through geological time (with particular focus on the Phanerozoic Eon): how the Wilson cycle model can provide an outline framework to understand these long term changes and the link to mass extinctions |
| (b) how the long term changes in 7.1.1(a) can be interpreted from both the geological record (palaeoenvironments) and the geochemistry of the rocks, including isotope studies |
| (c) how the current rate and scale of environmental and biological change illustrate the application of geochronological principles, and are of the same order as those used to divide the geological timescale |
| 7.1.2 Evolution and applied palaeontology[Delivery Guide](https://www.ocr.org.uk/Images/469410-module-7-basin-analysis.docx) | 13 | 12 | (i) how the evolution of life on Earth, displayed in the marine fossil record, is used as evidence to investigate long term gradual change: the adaption of the basic trilobite morphology to occupy multiple marine niches during the Palaeozoic |
| (ii) how the evolution of life on Earth, displayed in the marine fossil record, is used as evidence to investigate long term gradual change: the application of the ecology of modern reef building (scleractinian) corals to interpret and compare fossil corals (tabulate, rugose) as palaeoenvironmental indicators of reef building in the geological record |
| (iii) how the evolution of life on Earth, displayed in the marine fossil record, is used as evidence to investigate long term gradual change: the adaption of the basic brachiopod morphology to occupy high energy and low energy marine environments |
| (iv) how the evolution of life on Earth, displayed in the marine fossil record, is used as evidence to investigate long term gradual change: the morphological similarities and differences between brachiopods and bivalves |
| (i) how the evolution of life on Earth, displayed in the terrestrial fossil record, is used as evidence to investigate long term gradual change: how amphibians evolved from marine animals in the Devonian and were adapted to terrestrial life in the Carboniferous |
| (ii) how the evolution of life on Earth, displayed in the terrestrial fossil record, is used as evidence to investigate long term gradual change: the characteristics of the amniotic egg and the evolutionary advantage it gave for the development of life on land |
| (iii) how the evolution of life on Earth, displayed in the terrestrial fossil record, is used as evidence to investigate long term gradual change: the adaption of the basic dinosaur morphology to occupy different terrestrial niches as exemplified by saurischian (sauropoda, therapoda) and ornithichian dinosaurs |
| (iv) how the evolution of life on Earth, displayed in the terrestrial fossil record, is used as evidence to investigate long term gradual change: how birds evolved from therapoda and the morphological similarities and differences between birds and pterosauria |
| 7.1.3 Mass extinctions[Delivery Guide](https://www.ocr.org.uk/Images/469410-module-7-basin-analysis.docx) | 4 | 2 | (a) how the fossil record provides evidence for a number of short term catastrophic events through geological time known as mass extinctions and their probable causes |
| (b) how mass extinctions resulted in the replacement of the dominant forms in major ecological habitats |
| 7.2 Basin analysis in practice | 7.2.1 Lagerstätten deposits[Delivery Guide](https://www.ocr.org.uk/Images/469410-module-7-basin-analysis.docx) | 8 | 5 | (a)(i) the geological settings and sedimentary conditions that led to the exceptional preservation of organisms in key Lagerstätten deposits from the Middle Cambrian Burgess Shale (Canada) and the Lower Cambrian Chengjiang Formation (China): the mechanism of preservation of hard and soft tissues in these Lagerstätten deposits |
| (a)(ii) the geological settings and sedimentary conditions that led to the exceptional preservation of organisms in key Lagerstätten deposits from the Middle Cambrian Burgess Shale (Canada) and the Lower Cambrian Chengjiang Formation (China): how these Lagerstätten deposits provide the evidence for the Cambrian explosion |
| (b)(i) the geological settings and sedimentary conditions that led to the exceptional preservation of organisms in the Jurassic Solnhofen Limestone (Germany): the preservation of feathers, hard and soft tissues in a range of organisms |
| (b)(ii) the geological settings and sedimentary conditions that led to the exceptional preservation of organisms in the Jurassic Solnhofen Limestone (Germany): the evidence for the evolution of Archaeopteryx |
| 7.2.2 Oil and gas basins[Delivery Guide](https://www.ocr.org.uk/Images/469410-module-7-basin-analysis.docx) | 17 | 15 | (a)(i) the principles of basin analysis as applied to the prospecting for hydrocarbons in the North Sea Basin: the geological settings and sedimentary conditions that led to the formation of oil and natural gas in the North Sea Basin |
| (a)(ii) the principles of basin analysis as applied to the prospecting for hydrocarbons in the North Sea Basin: the palaeoenvironments where the source rocks, reservoir rocks and caprocks formed |
| (a)(iii) the process of maturation to form oil and natural gas in the source rock |
| (b)(i) the process of migration of oil and natural gas (fluids) from a source rock to reservoir rock under a caprock and the factors that control migration |
| (b)(ii) The process of rifting and synsedimentary faulting in the North Sea Basin which allowed oil and natural gas traps to form |
| (b)(iii) The accumulation of oil and gas in trap structures under caprocks  |
| (c)(i) geophysical exploration techniques to locate hydrocarbon reserves |
| (c)(ii) exploration drilling and downhole logging techniques to locate hydrocarbon reserves |
| (c)(iii) the use of microfossils in biostratigraphy and palaeoenvironmental analysis to locate hydrocarbon reserves |
| (d) how the same principles of basin analysis can be applied to onshore hydrocarbon basins |
| 7.2.3 Whole basin facies analysis[Delivery Guide](https://www.ocr.org.uk/Images/469410-module-7-basin-analysis.docx) | 13 | 10 | (a)(i) the principles of basin analysis to the integration of the sedimentology and palaeontology of the Welsh basin: the geological settings and sedimentary conditions in the Welsh Basin, throughout the Cambrian, Ordovician and Silurian periods |
| (a)(ii) how palaeoenvironments in the Welsh Basin can be determined by the analysis of facies (sediments and fossils) |
| (a)(iii) the zonation of the Welsh Basin using zone fossils |
| (b)(i) the principles of basin analysis in relation to the Jurassic rocks which crop out across the United Kingdom (in a local context): the evidence for the geological setting and cyclical sedimentation in shallow seas |
| (b)(ii) facies analysis of the sediments formed in the basin (sedimentary structures, sediment type and fossils) to determine palaeoenvrionments |
| (b)(iii) the zonation and correlation of the Jurassic Period using ammonites and belemnites |
| (c) practical investigation integrating field geology and secondary data (e.g. geological maps, seismic data, well logs, fossils) to understand the palaeoenvironments and geological history within the context of a basin wide study |

# Overview of One Teacher, two doubles, one single – Module 2

| **Week** | **Statements** | **Teaching activities** | **Notes** |
| --- | --- | --- | --- |
| 1 | 2.1.1(a) minerals as naturally occurring elements and inorganic compounds whose composition can be expressed as a chemical formula2.2.2 (b) the geochronological division of the geological column for the Phanerozoic into eras and periods using a biostratigraphic relative time sequence4.2.1 (a) the geochronological principles used to place geological events in relative time sequences in outcrops, photographs, maps and cross-sections to interpret geological histories | Mineral definitionClear and well laid-out resource which defines a mineral, with a relatively simple quiz at the end of the page. Learners could review this independently.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414164#414164)LyellThis resource describes how Lyell used the ideas of other Geologists to further the concept of uniformitarianism, how he rejected catastrophism in favour of gradual change, what he did not have was the theory of plate tectonics.[**View full activity in Sedimentary environments in time: Uniformitarianism and the rock cycle 4.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol04-module-4-interpreting-the-past/delivery-guide-ageol04a-sedimentary-environments-in-time-uniformitarianism-and-the-rock-cycle-411?activity=403386#403386) | DoubleIntro and welcome to the course. Refresher on Earth science / Geography building on KS3 / GCSE knowledge / experience.Use of Field Notebook/Practical Notebook“The best Geologist is the one who has seen the most rocks” Prof H.H.Read, Presidential Address, Section C, British Assoc., Dundee Meeting, 1939Practical activity: looking for the story in every rock |
| 2.1.1(a) minerals as naturally occurring elements and inorganic compounds whose composition can be expressed as a chemical formula2.1.1(b) rock-forming silicate minerals as crystalline materials built up from silicon–oxygen tetrahedra to form frameworks, sheets or chains and which may have a range of compositions2.1.1(c) (i) the diagnostic physical properties of rock-forming minerals in hand specimens | Is it a mineral?Shows the tetrahedra as 3D balls and has clear, short descriptions of the different structures. Diagrams are easy to understand.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414194#414194)Ball and stick modelsBall and stick models can be made to show the various silicate arrangements using improvised kits or Molymod® chemistry teaching kits.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414181#414181) | DoubleConcentrate on how the listed properties relate to mineral structure. Students are not required to memorise lists of characteristics of individual minerals. However they are expected to be able to apply their understanding of ‘diagnostic physical properties’ to identify unknown minerals using a key or table.Students fill in the blanks to create a glossary of terms.Building ball and stick modelsHomework: Silicate mineral jigsawCard sorting exercise to test student knowledge and understanding of silicate mineral structures.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414196#414196)Davies et al 2017 – 8-9 and 16-17 |
| 2.1.1(c) (iii) practical investigations to determine the density and hardness of mineral samples(iv) the techniques and procedures used to measure mass, length and volume | Be a mineral expert 1An observation based exercise to introduce colour, lustre, shape and cleavage.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414168#414168) | Single**PAG 1.1 Investigating minerals and rocks – Mineral testing** |
| 2 | 2.1.1 (c) (i) the diagnostic physical properties of rock-forming minerals in hand specimens.(ii) the classification of samples, photographs and thin section diagrams of minerals using their diagnostic physical properties2.1.1 (d) the classification of rocks, which are made up of one or more minerals, as igneous, sedimentary or metamorphic using their relationship to temperatures and pressures in the rock cycle2.1.2 (a) (ii) the diagnostic properties of rocks to identify igneous rocks in samples, photographs and thin section diagrams | P–T and the Rock CycleUsing students’ prior knowledge of the Rock Cycle they label a P–T diagram explore how rocks will change on a typical burial and exhumation trajectory.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414200#414200)Identifying common rock forming minerals in rocksDichotomous key for identifying the most common silicate and carbonate minerals in rock samples, outcrops and in building stones, using a basic tool kit (hand lens, steel nail and a piece of copper).[View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=417504#417504)An introduction to minerals and rocks under the microscopeA website using a virtual microscope. Thin sections of different rocks can be viewed. It also goes through six physical characteristics of minerals.[View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414172#414172) | DoubleIntroductory P–T domain activity Using key to identify the minerals in common rocks from the class teaching collection. Ideally comparing sandstone–quartzite & limestone–marble vs mudrock–schist/gneiss–graniteMaths – Magnification calculation guidance M1.4, M1.5Davies et al 2017 – 10-15 and 18-19 |
| 2.1.2 (a) (i) the classification of igneous rocks on the basis of their composition (silicic, intermediate, mafic and ultramafic) and crystal grain size (coarse-crystals >5 mm diameter; medium-crystals 1–5 mm diameter; fine-crystals <1 mm diameter)(ii) the diagnostic properties of rocks to identify igneous rocks in samples, photographs and thin section diagrams2.1.2 (b) (i) igneous textures, crystal shape and crystal size as evidence for depth of formation and rate of cooling of igneous rocks(ii) the diagnostic properties of igneous textures and crystal shape in samples, photographs and thin section diagrams(iv) the techniques and procedures used to measure temperature | Why do igneous rocks have different crystal sizesThree videos showing the effect of cold, room temperature and warm microscope slides on the crystallisation of salol. The fast and medium cooling rates are very clear in terms of crystal size and growth rate[**View full activity in Rocks and minerals: Igneous rocks 2.1.2 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02b-rocks-and-minerals-igneous-rocks-212?activity=414229#414229)Speed dating – igneous rocksA selection of igneous rocks are presented one at a time in a ‘circus’. Each student has each sample for one minute in which time they record details of the specimen and give it a name.[**View full activity in Rocks and minerals: Igneous rocks 2.1.2 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02b-rocks-and-minerals-igneous-rocks-212?activity=414227#414227)Granite case studyBackground information on a plutonic igneous rock setting. Learners could research further into the rock types found here and their textures.[**View full activity in Rocks and minerals: Igneous rocks 2.1.2 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02b-rocks-and-minerals-igneous-rocks-212?activity=414260#414260) | DoubleSpeed dating with rocks gets students familiar with handling and describing rocks in a low stakes environment and overcomes the fear of ‘getting it wrong’ –the best geologist is the one who has seen the most rocks!Homework: How do you measure temperature on a volcano?Students watch a short video of students from the University of Hawaii measuring temperature on the Kilauea lava flows.[**View full activity in Rocks and minerals: Igneous rocks 2.1.2 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02b-rocks-and-minerals-igneous-rocks-212?activity=414258#414258)This activity is intended to support 1.1.1 (Planning) and 1.1.2 (implementing) – similar principles can be applied to any scientific/temperature measurement/instrument calibration. Builds on and reinforces expectations of correct scientific procedures introduced in GCSE science lessons. Davies et al 2017 – 20-23 |
| 2.1.2 (b) (i) igneous textures, crystal shape and crystal size as evidence for depth of formation and rate of cooling of igneous rocks(iii) the representation using drawings and annotated diagrams of igneous textures and crystal shape in samples(iv) the techniques and procedures used to measure temperature |  | Single**PAG 3.1 Investigating crystalline processes – Crystallisation of salol** |
| 3 | 2.1.2 (a) (i) the classification of igneous rocks on the basis of their composition (silicic, intermediate, mafic and ultramafic) and crystal grain size (coarse-crystals >5 mm diameter; medium-crystals 1–5 mm diameter; fine-crystals <1 mm diameter)(ii) the diagnostic properties of rocks to identify igneous rocks in samples, photographs and thin section diagrams2.1.2 (b) (i) igneous textures, crystal shape and crystal size as evidence for depth of formation and rate of cooling of igneous rocks(ii) the diagnostic properties of igneous textures and crystal shape in samples, photographs and thin section diagrams | Identifying common rock forming minerals in rocksDichotomous key for identifying the most common silicate and carbonate minerals in rock samples, outcrops and in building stones, using a basic tool kit (hand lens, steel nail and a piece of copper).[View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=417504#417504)An introduction to minerals and rocks under the microscopeA website using a virtual microscope. Thin sections of different rocks can be viewed. It also goes through six physical characteristics of minerals.[**View full activity in Rocks and minerals: Minerals 2.1.1 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=414172#414172)Igneous rock texture and compositionBackground information on a plutonic igneous rock setting. Learners could research further into the rock types found here and their textures.[**View full activity in Rocks and minerals: Igneous rocks 2.1.2 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02b-rocks-and-minerals-igneous-rocks-212?activity=414231#414231) | DoubleClass teaching collection, igneous rocks, or laminates of photomicrographs of a porphyritic granite.Virtual microscope/laminated photomicrographs to investigate and draw common igneous textures.Royal Microscopical Society resources accompanying **PAG 3.2**Maths – gathering data such as crystal sizes which can then be analysed. M1.3, M2.4, M2.5, M2.6, M2.7, M2.8, M2.9Drawing skills – refer to Drawing Skills HandbookDavies et al 2017 – 24-27 |
| 2.1.2 (b) (i) igneous textures, crystal shape and crystal size as evidence for depth of formation and rate of cooling of igneous rocks(iii) the representation using drawings and annotated diagrams of igneous textures and crystal shape in samples | Drawing Skills HandbookH014 H414 - This drawing skills handbook is designed to accompany the AS and A Level Geology qualifications for teaching from September 2017[Drawing](https://www.ocr.org.uk/Images/415099-maths-skills-handbook.pdf) skills PDF 2MB | SingleIntroduction to microscopy, objective is to identify and draw some minerals. Uses PAG 3.2 but treat this as a practice activity and give students an edited version of the instructions without the extension activities. Probably best to use this first experience of microscopy to allow students to develop skills.**PAG 3.2 Investigating crystalline processes – Virtual microscope**  |
| 2.1.3 (a) weathering and erosion, the mechanical, chemical and biological processes that produce the sediments that form sedimentary rocks2.1.3 (b) (i) the effect of the process of erosion on the characteristics and composition of modern sediments(ii) sieve analysis of sediments | Chemical weatheringA site with clear explanations of the chemical weathering processes. It refers to soil being an agricultural website.[View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414274#414274)Biological weatheringPictures of different types of biological weathering as well as links to physical and chemical weathering.[**View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414278#414278)Dry valleys of AntarcticaAn example of extreme aridity where weathering is brought to a virtual standstill.[**View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414276#414276)Hjulström curveA youtube video which runs through the Hjulström curve.[**View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414280#414280) | DoubleSediment descriptions, not all sand is the same and each has a story.How do sediments form including clay minerals/sediments.Concept of maturity:* compositional maturity
* textural maturity

Davies et al 2017 – 52-55 |
| 4 | 2.1.3 (b) (i) the effect of the process of erosion on the characteristics and composition of modern sediments(ii) sieve analysis of sediments2.1.3 (c) the diagnostic properties of rocks to recognise and measure grain sizes in samples, photographs and thin section diagrams2.1.3 (d) (i) the classification of siliciclastic rocks on the basis of their diagnostic properties (colour, composition, grain size and grain shape, sorting) (iii) the diagnostic properties of rocks to identify siliciclastic and carbonate rocks in samples, photographs and thin section diagrams | Sandstone – ferruginous areniteMicrographs of iron cemented sandstone showing thin layer of haematite around the sand grains.[View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414296#414296)Speed dating – sedimentary rocksA selection of sedimentary rocks are presented one at a time in a ‘circus’. The students have each sample for two minutes in which time they record details of the specimen and give it a name.[**View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414284#414284) | DoubleClass teaching collection, arenaceous sedimentary rocks, or laminates of photomicrographs of sandstones and rudites..Virtual microscope/laminated photomicrographs to investigate and draw common sedimentary grain shapes and sorting.Maths – gathering data such as grain sizes which can then be analysed. M1.3, M2.4, M2.5, M2.6, M2.7, M2.8, M2.9Drawing skills – refer to Drawing Skills HandbookDavies et al 2017 – 56-59 |
| 2.1.3 (b) (i) the effect of the process of erosion on the characteristics and composition of modern sediments(ii) sieve analysis of sediments2.1.3 (c) the diagnostic properties of rocks to recognise and measure grain sizes in samples, photographs and thin section diagrams2.1.3 (d) (ii) the classification of carbonate rocks on the basis of their diagnostic properties (grain size, cement, mineral composition and fossil content, and sorting)(iii) the diagnostic properties of rocks to identify siliciclastic and carbonate rocks in samples, photographs and thin section diagrams | Dunham classificationUseful diagram of the Dunham’s classification, as well as distinguishing between Dunham and Folk classification.[View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414286#414286)Speed dating – sedimentary rocksA selection of sedimentary rocks are presented one at a time in a ‘circus’. The students have each sample for two minutes in which time they record details of the specimen and give it a name.[**View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414284#414284) | DoubleClass teaching collection, carbonate sedimentary rocks, or laminates of photomicrographs of carbonate rocks.Virtual microscope/laminated photomicrographs to investigate and draw common carbonate grain shapes and sorting.Drawing skills – refer to Drawing Skills HandbookAcid test on limestones of different purities, including a magnesium limestone or a dolomite sample.Preparation for sediment sievingDavies et al 2017 – 60-61 |
| 2.1.3 (b) (ii) sieve analysis of sediments2.1.3 (c) the diagnostic properties of rocks to recognise and measure grain sizes in samples, photographs and thin section diagrams |  | Single**PAG 3.1 Investigating crystalline processes – Crystallisation of salol** |
| 5 | 2.1.3 (e) the processes of diagenesis and lithification:(i) mechanical compaction(ii) chemical compaction by pressure dissolution and recrystallisation(iii) growth of cements(iv) how these changes in rock texture modify the porosity and permeability of rocks | Diagenesis of Sandstones – cementationA very clear account of the different cements.[View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414294#414294)Pressure dissolutionPhotomicrograph of two quartz grains showing indentation at contact and quartz cement produced by pressure dissolution.[**View full activity in Rocks and minerals: Sedimentary rocks 2.1.3 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02c-rocks-and-minerals-sedimentary-rocks-213?activity=414292#414292) | DoubleUsing ball pit balls or circular counters to model packing. Coins can be used to see how 2D discs of different or similar sizes will pack.Maths – modelling theoretical porosity by comparing hexagonal or face centred packing (≈26%) with lattice packing (≈48%).Davies et al 2017 – 62-63 |
| 1.2.3 (e) (a) the measurement and description of the diagnostic properties of rocks in the field | Barkingside: A suburban geological town trailThe urban geology of Barkingside has been produced to stand as a ‘model answer’ for teachers and students who want to make their own town trail from their own observations.[**Self-guided walks to introduce Urban Geology in towns & cities.**](http://www.ucl.ac.uk/~ucfbrxs/Homepage/walks/Barkingside.pdf) | **Double – Local Fieldwork**Local urban field trip to introduce students to urban geology and to set up PAG 1.3 which will be completed by students over the next two to three weeks, before presenting back to the class.**PAG 1.3 Investigating minerals and rocks – Geology on the street** |
| 2.1.2 (a) (i) the classification of igneous rocks on the basis of their composition (silicic, intermediate, mafic and ultramafic) and crystal grain size (coarse-crystals >5 mm diameter; medium-crystals 1–5 mm diameter; fine-crystals <1 mm diameter)2.1.3 (d) (iii) the diagnostic properties of rocks to identify siliciclastic and carbonate rocks in samples, photographs and thin section diagrams |  | Single**PAG 1.2 Investigating minerals and rocks – Describing rocks** |
| 6 | 2.1.4 (a) metamorphism as a solid state isochemical process that changes the characteristics of rock | Modelling metamorphismA basic introduction into how metamorphic rocks form. The activity outlines 3 simple experiments which learners can carry out.[View full activity in Rocks and minerals: Metamorphic rocks 2.1.4 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02d-rocks-and-minerals-metamorphic-rocks-214?activity=414320#414320)Loch AssyntA series of photos of a fault plane which get more detailed. The last one shows individual fault blocks and the fine-grained ground up rock called fault gouge.[View full activity in Rocks and minerals: Metamorphic rocks 2.1.4 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02d-rocks-and-minerals-metamorphic-rocks-214?activity=414326#414326) | DoubleOur own teaching activities:Class teaching collection, metamorphic rocks, or laminates of photomicrographs of metamorphic rocks.Davies et al 2017 – 90-91 |
| 2.1.4 (j) how the mineralogy and fabric of metamorphic rocks can be used to infer the composition of the parent rock2.1.4 (c) how as the intensity of metamorphism changes different minerals form which can be used to reconstruct the conditions of metamorphism | Pressure–Temperature DiagramsUsing a basic P–T diagram students annotate it with rock types and metamorphism types to familiarise themselves with the P–T domain and plotting isograds.[View full activity in Rocks and minerals: Metamorphic rocks 2.1.4 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02d-rocks-and-minerals-metamorphic-rocks-214?activity=414322#414322)Metamorphic Grade 2 – Zones and index mineralsThe section ‘Zones and index minerals’ has a useful diagram of metamorphic intensity which is used in the exercise listed below.[**View full activity in Rocks and minerals: Metamorphic rocks 2.1.4 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02d-rocks-and-minerals-metamorphic-rocks-214?activity=414338#414338)Metamorphic Grade 3 – Zones and index mineralsThe Al2SiO5 diagram is used here to help label the three zones on the P-T diagram.[**View full activity in Rocks and minerals: Metamorphic rocks 2.1.4 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02d-rocks-and-minerals-metamorphic-rocks-214?activity=414340#414340) | DoubleRock descriptions and virtual microscopeClass teaching collection, metamorphic rocks, or laminates of photomicrographs of metamorphic rocks.Specifics Barrovian minerals and Isograds is A level only 5.4.1 (a)Davies et al 2017 – 92-93 |
| 2.1.4 (c) how as the intensity of metamorphism changes different minerals form which can be used to reconstruct the conditions of metamorphism2.1.1 (c)(ii) the classification of samples, photographs and thin section diagrams of minerals using their diagnostic physical properties | Identifying common rock forming minerals in rocksDichotomous key for identifying the most common silicate and carbonate minerals in rock samples, outcrops and in building stones, using a basic tool kit (hand lens, steel nail and a piece of copper).[View full activity in Rocks and minerals: Metamorphic rocks 2.1.4 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02a-rocks-and-minerals-minerals-211?activity=417504#417504) | Single**PAG 1.2 Investigating minerals and rocks – Describing rocks**or**PAG 3.2 Investigating crystalline processes – Virtual microscope** |
| 7 | 2.2.2 (a) (i) the use of radioactive decay rates of the radionuclides in minerals to give a numerical age of those minerals and rocks(ii) the plotting and interpretation of half-life curves | A very deep question: just how old is Earth?A ‘Scientific Story’ that explores why if the problem was solved in the 1913 it took until the 1950s to convince most scientists. It also challenges the misconception of this as a battle between science and religion.[View full activity in Fossils and time: Geological time 2.2.2 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=417514#417514)Decay curves for uranium and leadDecay curves for Uranium lead explained.[View full activity in Fossils and time: Geological time 2.2.2 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=414483#414483)Decay curves for uranium and leadDecay curves for Uranium lead explained.[**View full activity in Fossils and time: Geological time 2.2.2 - Online delivery guide**](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=414483#414483) | DoubleRe-cap summary and end of topic test[**End of topic quiz 1: Minerals and rocks**](https://interchange.ocr.org.uk/Downloads/H014_End_of_Topic_Quiz.zip)Higher tier GCSE (9–1) Combined Science and Physics assumed prior knowledge:* recall that atoms of the same elements can differ in mass number by having different numbers of neutrons
* explain the concept of half-life and how this is related to the random nature of radioactive decay
* calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives

Davies et al 2017 – 108-109 |
| 2.2.1 (a) fossils as the preserved remains of living organisms or the traces of those organisms2.2.1 (b) the nature and the reliability of the fossil record and the morphological definition of species | Storyboarding for the formation of a fossilA story board is a technique to summarise and plan a video, animation or visual presentation, using a sequential series of linked sketches and text. This approach should be familiar to students from English or Drama.[View full activity in Fossils and time: Fossils 2.2.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02e-fossils-and-time-fossils-221?activity=414384#414384)Modeling taphonomic processes in the laboratoryThis activity was developed to support the reformed OCR Geology course by [www.Palaeocast.com](file:///C%3A%5CUsers%5Ccruikc%5CAppData%5CLocal%5CMicrosoft%5CWindows%5CTemporary%20Internet%20Files%5CContent.Outlook%5C3D5QXE2J%5Cwww.Palaeocast.com). Identifying how increased transportation results in the loss of anatomical information. Uses online video and resources investigating effects of transport processes on preservation of polycheate worms.[View full activity in Fossils and time: Fossils 2.2.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02e-fossils-and-time-fossils-221#414370)TrilobitesThis activity was developed to support the reformed OCR Geology course by www.Palaeocast.com. An introduction to trilobites, identifying their features in realistic specimens and interpreting palaeoecology.[View full activity in Fossils and time: Fossils 2.2.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=414457#414457) | DoubleA common misconception is to only focus on part of the taphonomic process. Non-palaeontologists concentrate on the deposition and mineralisation of remains (i.e. fossilisation) while palaeoecologists may concentrate on the biological processes after death. It is important to consider the interaction of biological, chemical and physical taphonomic processes. Taphonomy is important when understanding reliability of the fossil record; some processes reduce information (e.g. decay) while others increase information (e.g. evidence of predation or social behaviour).Road kill as an analogy for selective nature of the fossil record. see also Roadkill as Teaching Aids in Historical Geology and Paleontology, Hans G. Machel 1996 Journal of Geoscience Education v44 n3 p270-276 Davies et al 2017 – 100-101 |
| 2.2.1 (a) fossils as the preserved remains of living organisms or the traces of those organisms2.2.1 (c) the use and interpretation of fossils as palaeoenvironmental indicators:(ii) body fossils to provide information on the behaviour of the fossilised organism and the palaeoenvironment | Drawing Skills HandbookH014 H414 - This drawing skills handbook is designed to accompany the AS and A Level Geology qualifications for teaching from September 2017[Drawing](https://www.ocr.org.uk/Images/415099-maths-skills-handbook.pdf) skills PDF 2MB | Single**PAG 5.1 Investigating fossils – Identifying fossils**Class teaching set of fossils. Ideally should contain a range of partial and whole fossils of variable quality with a few casts of museum grade fossils. It is important for students to experience genuine partial/degraded fossil material as well as casts of ‘perfect’ museum grade fossils |
| 8 | 2.2.1 (c) the use and interpretation of fossils as palaeoenvironmental indicators:(i) trace fossils to provide information on the behaviour of the organism that formed them and the palaeoenvironment(ii) body fossils to provide information on the behaviour of the fossilised organism and the palaeoenvironment2.2.2 (b) the geochronological division of the geological column for the Phanerozoic into eras and periods using a biostratigraphic relative time sequence | Fossil morphology and adaptionsA series of activities that could be applied to any of the fossil groups studied in A2 Unit 795: Evolution of Life, Earth and Climate – printable resources have been included for the trilobite section with extension resources for ammonites, brachiopods, bivalves and echinoids.[View full activity in Fossils and time: Fossils 2.2.1 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=414481#414481)Fossil galleryAn easy to use reference tool which divides fossils based on their classification. Learners are provided with information on the morphology of the creature, photographs and the time frame in which they existed.[View full activity in Fossils and time: Geological time 2.2.2 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=414479#414479) | DoubleStudents to have own reference drawings of one from each of the main fossil groups: trilobites, corals, brachiopods, bivalves and cephalopods. Will need to cover some other characteristic members of Palaeozoic, Mesozoic and Cainozoic faunasClass teaching set of fossils. Ideally should contain a range of partial and whole fossils of variable quality with some a few casts of museum grade fossils. It is important for students to experience genuine partial/degraded fossil material.Davies et al 2017 – 102-105 |
| 2.2.2 (b) the geochronological division of the geological column for the Phanerozoic into eras and periods using a biostratigraphic relative time sequence | KS4 Science – KS5 Geology Checkpoint TaskThe geological setting of the task is a cross section through an imaginary rock outcrop exposed in the side of a valley. The sequence includes igneous features and a sedimentary sequence. A number of fossils have been identified in the area. Students use the fossils present to discuss how fossils can be used in dating a sequence of rocks.[View full activity in Fossils and time: Geological time 2.2.2 - Online delivery guide](https://www.ocr.org.uk/qualifications/as-a-level-gce-geology-h014-h414-from-2017/delivery-guide/module-ageol02-module-2-foundations-in-geology/delivery-guide-ageol02f-fossils-and-time-geological-time-222?activity=414485#414485) | DoubleOwn teaching activities using geological maps and fossilsClass teaching set of fossils. Ideally should contain a range of partial and whole fossils of variable quality with some a few casts of museum grade fossils. It is important for students to experience genuine partial/degraded fossil material.Davies et al 2017 – 114-115 |
| 2.1.1(c) the use of staining in light microscopy |  | SingleRe-cap summary and end of topic test[**End of topic quiz 2: Fossils and time**](https://interchange.ocr.org.uk/Downloads/H014_End_of_Topic_Quiz.zip)Look ahead to next topic - HW: ideas about terrestrial planets, origin, composition and thermal history/tectonics |

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