

Are you ready for S209?

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Your study of *Earth science* (S209) will be more enjoyable, rewarding and successful if you make sure beforehand that you have the necessary background knowledge and skills to give you a sound platform from which to tackle the module.

Before studying S209 it is recommended that you study either S112 *Science: concepts and practice* or have studied its predecessor S104 *Exploring science* (discontinued).

To be sure that you have the necessary skills, we suggest you read the **Mathematical skills** and **Earth science fundamentals** sections below as a guide to the knowledge, skills and concepts that it is assumed S209 students will bring with them when they begin the module, and on which they will build. If you wish, you can then also test yourself with the 'Are You Ready For S209?' quizzes, short web-based sets of diagnostic self-assessment questions for prospective students of S209 Earth science.

The questions are broken into two sets, one covering requisite [mathematical skills](#) and the other key [Earth science concepts](#). You will receive feedback on each question as you complete it, and, at the end, overall feedback on each set that should enable you to judge for yourself whether or not you have an appropriate level of knowledge to embark on S209.

You should expect to spend no more than 1 hour working through each quiz. Your responses will not be visible to other students.

If you have not studied with The Open University before or if after working through this material you are still not sure whether S209 is the right course for you, then we recommend you contact an advisor to discuss your plans.

We have included some suggested sources of further reading below that should help you to fill any gaps, or revise areas of weakness, in your knowledge and skills in readiness for studying this geology course.

Mathematical skills

Are you comfortable with performing the following basic mathematical skills?

- Calculations using addition, subtraction, division and multiplication
- Using a scientific calculator
- Understanding scientific notation for large and small numbers using powers of ten (e.g. 10^3 , 10^{-5} , 7.3×10^{-1}); (S112 Topic 1 Part 1.1; S104 Book 1 Chapter 3 and Book 2: Chapter 13; S154 Chapter 2 and Chapter 9)
- Simple unit conversions (e.g. μm to mm; mm to m; g to kg)
- Manipulation of equations, involving addition, subtraction, division or multiplication, to find an unknown term
- Plotting data on graphs (by hand and electronically), choosing appropriate scales and axes
- Interpreting graphical data correctly
- Expressing quantities as ratios, fractions or percentages
- Calculating areas or volumes using given formulae, with appropriate units
- Quoting values to an appropriate number of significant figures

If you would like to test your basic mathematical skills, why not try the [‘Are You Ready For S209?’ mathematical skills quiz?](#)

The [Maths for Science](#) webpage contains resources and further reading that you may find useful.

Earth science fundamentals

Are you familiar with the following basic Earth science concepts or skills?

- The rock cycle (S112 Topic 2, part 5; Topic 3, part 1.4)
- Igneous, metamorphic and sedimentary rocks (distinguishing between these main groups; basic characteristics; processes of formation) (S112 Topic 2 Introduction, Parts 2-4; Topic 3, parts 1.1-1.3)
- Weathering (chemical and physical); erosion (S112 Topic 2, parts 4.1, 4.2)
- Tectonics: movement and deformation of the Earth’s crust (S112 Topic 4, part 1)
- Plate tectonics, processes at plate boundaries (S112 Topic 4)
- Making simple observations of rock samples and interpreting them in terms of geological processes (S112 Topic 2, Part 5)
- Geological time: the stratigraphic column and geological timescale (S112 Topic 3, part 2)
- The distinction between relative and absolute dating of geological events (S112 Topic 3, Part 3)
- Common chemical symbols and formulae (S112 Topic 11, Part 1.2)
- Using graphs, maps and diagrams to present information or illustrate ideas and processes (Throughout S112 e.g. Topic 20, part 3.1)
- Recognising areas of different rocks on a geological map, using the key (S112 Topic 3, part 2.9.1)

If you would like to test your level of Earth science knowledge, why not try the [‘Are You Ready For S209?’ Earth science fundamentals quiz?](#)

Other skills

You will also find it useful to have acquired, or begun to acquire, the following skills, although they are not assessed directly in this quiz.

Basic study skills: organising your study time; learning to pace your study; effective reading to identify and extract relevant information from irrelevant or redundant material; retrieving data from scientific texts and accounts.

Writing skills: writing coherently; structuring and presenting arguments in a logical sequence; writing a scientific account with appropriate diagrams.

Cognitive skills: recognising trends and patterns in data; using evidence to support or refute theories and arguments; assessing the adequacy/limitations of explanations.

Problem-solving skills: solving problems using given evidence (including negative evidence), and using more than one source of information.

Computer skills: basic mouse and keyboard skills; familiarity with basic Windows operations and web browsers; saving, moving and backing up files.

Spreadsheets are also used in S209. While some associated skills are taught during the module, it will save you time if you are confident completing the following operations, in either Microsoft Excel or OpenOffice Calc:

- using cells, rows, columns, inputting data, cutting and pasting data; sorting data; selecting and highlighting cells
- producing graphs, especially ('X–Y') scatter plots with trend lines
- using functions and simple formulae: sum, average, mean, standard deviation, linear correlation and linear regression
- copying and pasting graphs into Microsoft Word or OpenOffice Writer documents, reformatting where necessary.

An online search should reveal a number of tutorials, including video tutorials, for Excel and Calc if you are unsure how to do any of these things.

Preparation for S209

If, after completing the quizzes, you feel that you do have the required skills and knowledge to begin S209 then you can sign up for a coming presentation. However, if you do not yet feel ready to do this, or had difficulty with particular parts of the quizzes, then you may wish to consider the following options.

- 1 Obtain a copy of *The Sciences Good Study Guide* (Northedge et al., Open University, 1997, ISBN 0–7492–3411–3), which is specially written for OU science students and contains a wealth of guidance on studying science modules. It includes a large 'maths help' section with almost 100 pages of worked examples of basic mathematical calculations.
- 2 Read the sections of the OU module S112 *Science: concepts and practice* that are most relevant to S209. Specifically, these are:
 - the nature of earthquakes and volcanic eruptions: S112 Topic 4
 - the structure of the Earth's interior: S112 Topic 4
 - chemical formulae, equations and simple calculations: S112 Topic 11, part 1
 - biological evolution and species classification: S112, Topic 3 Part 2.9
 - generation of magmas by partial melting; magma crystallisation: S112 Topic 2 part 2.1
 - distribution of silicate minerals in crustal rocks: S112 Topic 2 part 1.5
 - radiometric dating S112 Topic 3 Part 3.4
 - subdivision of igneous rocks by grain size, mineral and chemical composition: S112 Topic 2 Part 2.2
 - effects of tensional (faults: S112 Topic 3, part 2.4) and compressional forces (folding: S112 Topic 3, Part 2.3; metamorphic S112 Topic 2 part 3.2) on rocks
 - weathering; erosion, transport and deposition of sedimentary materials: S112 Topic 4 part 4.1–4.4
 - evidence for the environment of formation of sedimentary rocks (grain-size distribution, sedimentary structures, mineral composition) S112 Topic 4
 - subdivision of sedimentary rocks according to grain size: S112 Topic 3 part 1.3

- fossils: identification of common groups and differences in body plans: S112 Topic 3, part 2.9
- key events in the history of life (extinctions, evolutionary radiations) : S112 Topic 3 part 2.9
- establishing a relative geological timescale using fossils, structures and relationships between bodies of rock (i.e. strata, igneous intrusions) : S112 Topic 3 part 2.9

3 Read any undergraduate books on earth science or geology. Some suggestions are included below:

Rothery, D. (2008) Teach Yourself Geology (3rd edn), Hodder Education, ISBN 0 340 958790.

Natural History Museum publications (available from their [online bookshop](#))

Van Rose, S. and Mercer, I. (1999) Volcanoes (2nd edn), The Natural History Museum, ISBN 0 565 09138 7.

Edwards, K. and Rosen, B. (2004) From the Beginning (revised reprint), The Natural History Museum, ISBN 0 565 09142 5.

Earthwise publications (available from the British Geological Survey [onlinebookshop](#))

Van Rose, S. (1997) Earthquakes – our trembling planet, ISBN 0852722877.

Rigby, R. (1997) Fossils: the story of life, British Geological Survey, ISBN 0852722842.

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