# Are you ready for S111? (Offline version)

## Contents

## Introduction

Questions in science (S111) is an introductory science module that encompasses astronomy and planetary science; biology; chemistry; Earth and environmental science; and physics. A series of questions, starting with 'Can you make a hole in water? and 'How do you know what is alive?', teaches scientific thinking. You will undertake a significant number of practical experiments, both 'hands-on' in your own home and online. S111 also develops generic study skills and maths skills.

S111 is the Stage 1 introductory module in the Open University's Natural Sciences qualification pathway. Alternatively, you may be studying it as part of an Open qualification.

In order to study S111 successfully you need to be sufficiently prepared. This module is delivered entirely online, so you need access to a computer linked to the internet and you need some basic numeracy skills and an ability to read and write to a good standard in English. It would also be valuable to have some basic science general knowledge. You will also need enough time - a minimum of 16-18 hours per week - for studying S111.

Are you ready for S111? is a set of five short tests, each with a set of self-assessment questions, designed to help you decide whether you are sufficiently prepared to start studying this module. When you have completed the quiz you will be given a summary of your performance and some general feedback about whether S111 is a sensible choice for you at the present time, or whether you need to either engage with some additional preparatory work before S111 begins, or consider studying an Open University Access module before attempting S111 (you can learn more about Access modules via this link).

### Getting started

In the online version of this 'Are you ready for S111? Quiz there is a video in which Dr Nicholas Chatterton explains the importance of using these quizzes to determine whether you're ready to start S111 Questions in Science.

The transcript of the video is below. Please read it and then complete the quizzes below the transcript.

DR. NICK CHATTERTON: Hello, welcome to this quick quiz to check your readiness for the module S111, *Questions in science*.

My name is Dr. Nick Chatterton, and I'm one of the numerous people from the Open University who's helped put this module together for you.

In S111, we will teach you topics from across the sciences and also teach you how to investigate the world around you like a scientist through the numerous practical investigations we've put together in each of the topics.

We don't just want you to learn scientific facts, we also want you to learn how to think like a scientist. But before you start, you need to check whether you are ready to study S111. To help, we designed a quick self-assessment quiz, called Are You Ready For S111?

The quiz itself is divided into four separate parts that will make you think about all the essential things you either need to have or be able to  do to study S111 successfully. So make sure you do the test carefully as time doing this is definitely time well-spent.

Part one allows you to assess whether you have the time required and the computing ability to study S111. You'll need a minimum of 16 to 18 hours per week for successful study.
In addition, S111 is delivered entirely online. There are no books. You need access to a computer with an internet connection and be prepared to read, watch and engage with the study materials online.

Part two allows you to test your maths skills. You need to have basic numeracy skills, including addition, subtraction, multiplication, division, and the use of decimal numbers and percentages.

Part three tests your English skills. Can you understand and use written English at the standard found in newspapers like The Telegraph or The Guardian?

Part four assesses your scientific thinking.

Once you finish the quiz, you'll be given a summary for each part. This will tell you how you did and whether you're ready to study S111. For example, you may be asked to do some extra prep work or to contact the student support team for further information before you start the module.

So please do the quiz and follow any advice you're given. We look forward to welcoming you to the module when your studies begin and we wish you every success.

This assessment should take you about an hour in total.
Please make sure that you complete *all* the tests to identify your strengths and weaknesses.

The answers and feedback are given at the end of the document.

# Part 1: Do I have enough time to study S111?

## Question 1

We would like you to think about how much time you have available for your study.

Use the table below to calculate the total time you have available for study. Enter a figure for each activity each day. Then:

EITHER sum the number of hours used for all the activities for each day in turn, and write the total in the second-last row of the appropriate column, then subtract each of these totals from 24 to complete the time

available for study each day in the bottom row. Then add the time available each day to give your weekly total in the cell marked *;

OR sum the total number of hours used for each activity over seven days and enter this in the final column, then add these weekly totals to give your combined total. Then, subtract this total from 168 to complete the time available for study each week in the cell marked *.

| | In each 24 hour day | | | | | | | Weekly totals |
|---|---|---|---|---|---|---|---|---|
| **Hours in the day** | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 168 |
| | Mon | Tues | Wed | Thu | Fri | Sat | Sun | |
| Work hours | | | | | | | | |
| Travelling time | | | | | | | | |
| Quality family time | | | | | | | | |
| Socialising | | | | | | | | |
| Housework/Gardening | | | | | | | | |
| Shopping | | | | | | | | |
| Exercise/Health | | | | | | | | |
| Eating | | | | | | | | |
| Sleeping | | | | | | | | |
| Other | | | | | | | | |
| **Total used** | | | | | | | | |
| **Time available for study** (= hours in day minus total used) | | | | | | | | * |

Answer: I will have *_____ hours available for study each week.


# Part 2: Do I have enough computing experience to study S111?

This section of the quiz looks at the computing skills required for studying S111.

You will need access to a computer and to the internet for regular periods of study. This module is delivered entirely online. There are no books. You will need access to a computer with a reliable internet connection, and you must be prepared to read, watch and engage with the study materials online. The module will have many live web-links, and you will need to use the internet to access web-based sources of information (such as the Open University Library), to attend online tutorials, and to communicate with your tutor and fellow students.

In addition you will have to work online to complete interactive computer marked assignments (iCMAs) and to submit your tutor-marked assignments (TMAs) electronically. Some activities or assignment questions may require you to upload scanned images or photographs.

Answer the following questions. Calculate your score for this quiz simply by adding up the number of times you answer "yes". If you answer yes to all of the question parts (17 in total), you are suitably prepared for the computing aspects of S111. If you answer no to any of these, you should find out how to do these things before you start the module. Guidance will not be provided on these computing skills as part of the module, although more general advice is provided by The Open University.

|  | Yes | No |
|---|---|---|
| **Question 1** | | |
| Do you have regular access (i.e. for at least 16 hours a week) to a computer for your personal use? | | |
| **Question 2** | | |
| Does the computer you have access to run one of the following:<br>• a Windows desktop or laptop computer running Windows 7 or later operating system?<br>• a Macintosh desktop or laptop computer running OS X 10.7 or later operating system?<br>The screen size should allow you to read comfortably and edit documents, for example when completing an assignment. | | |
| **Question 3** | | |
| Do you have ready access to the internet for 16 hours (and sometimes for sustained periods) each week?<br>Note that we recommend a minimum 1 Mbps internet connection and any of the following browsers for carrying out web-based activities:<br>• Internet Explorer 9 and above<br>• Apple Safari 7 and above<br>• Google Chrome 31 and above<br>• Mozilla Firefox 31 and above. | | |
| **Question 4** | | |
| Are you comfortable performing the following essential actions on your computer?<br>•Using the mouse and keyboard, or alternative tools designed to replicate these functions, to navigate around the screen? | | |
| •Using a word-processing program to create, edit and save documents? | | |
| •Creating and organising files and folders so that you can find your documents again? | | |
| •Using web-browsing software to find and navigate around websites? | | |
| •Using email? | | |
| **Question 5** | | |
| Are you comfortable performing the following useful actions on your computer?<br>•Opening a link in a browser in a new tab or window? | | |
| •Managing bookmarks or favourite locations in your browser? | | |
| •Zipping files? | | |
| •Downloading and uploading files? | | |

# Part 3: Are my maths skills good enough?

This section has questions on simple arithmetic, on the use of fractions, decimal numbers, ratios and percentages, and on reading a simple chart. You should have these basic numeracy skills before you start.

You may want to use a calculator.

## Question 1

The decimal number 23.3479 is expressed to four decimal places (i.e. there are four numbers after the decimal point). If 23.3479 is rounded to three decimal places, it becomes 23.348, because the fourth digit after the decimal place (9) is '5 or more' – so the third digit is rounded up from 7 to 8. If the fourth digit had been less than 5, the third digit would not have been rounded up.

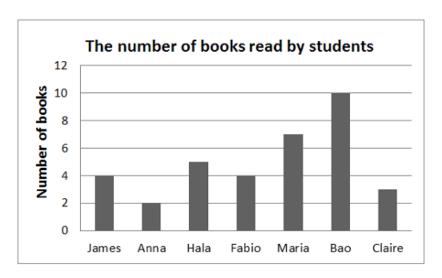Follow the '5 or more' rule to round 23.3479 to

(i) two decimal places

(ii) one decimal place

## Question 2

I am carrying out an experiment using salicylic acid (otherwise known as aspirin). I look in the laboratory store cupboard, but no one bottle of this chemical contains quite enough for my experiment. I find three bottles. The first bottle contains 17.0 g of salicylic acid, the second has 3.142 g, and the third bottle has 1011.8 g. I use all three bottles, though at the end of my experiment one of the bottles has 0.97 g of salicylic acid left (the other two are empty).

How much salicylic acid have I used? Give your answer to 3 decimal places.

Answer: _____ grams

## Question 3

Unleaded petrol costs £1.37 per litre. How much will 9 litres cost?

Give your answer in full (with no rounding).

Total cost of 9 litres of petrol = £ _____

## Question 4

A chemistry teacher has £56.50 to spend on purchasing specialist test tubes which cost 70p each. How many test tubes can he order?

Answer: _____ test tubes

## Question 5

What is 12% of £3600?

£ _____

## Question 6

The fraction one-half (written $\frac{1}{2}$), the decimal number 0.5, and the percentage 50% all mean the same thing. We converted one-half to its decimal equivalent by dividing 1 by 2 (i.e. we divided the numerator of the fraction by the denominator). We converted one-half to a percentage by multiplying the decimal equivalent by 100.

We've given you another fraction below. Enter the corresponding decimal number and percentage into the boxes provided.

Fraction $\frac{3}{4}$ = Decimal number _____ = Percentage _____ %

## Question 7

The chart (overleaf) shows the number of books read by a group of seven students over a period of three months.

The number of books read by students

Complete the boxes to indicate the number of books read by Hala and the total number of books read by the whole group.

The number of books read by Hala = _____

The total number of books read by the whole group = _____

## Question 8



A recipe gives the ratio of sugar to butter for making shortbread as 7 : 4.

Suppose that you have 210 g of sugar with which to make shortbread. How much butter will you need?

Answer: _____ g of butter

## Question 9

In an election 1248 votes out of 3000 are cast for the Gold party. What is this as a percentage?

Give your answer in full (with no rounding).

Percentage = _____ %

## Question 10

A path is 4717 metres long. What is its length in kilometres?

Give your answer in full (with no rounding).

Answer: _____ km

# Part 4: Is my English good enough?

This English section asks you to demonstrate that you are able to understand and use written English of the standard of broadsheet newspapers, for example The Telegraph or The Guardian.

## Question 1

Pick the sentence that gives you the most information and is clear and unambiguous. Select one of the four below:

1. Water can exist in three phases: a solid phase called ice, a liquid phase called water, and a gaseous phase called water vapour.

2. There are several phases of water and these phases include water, water ice and water vapour.

3. Gaseous water is water vapour whereas solid water is ice and of course water can also be a liquid as well, in which case it is referred to as water.

4. Water can be solid, and is then called ice and can also be a liquid and a gas as well, existing as a vapour, thus water exists in more than one phase.

## Question 2

Read the following paragraphs and answer the question that follows.

> *Because atoms are extremely small, we need a model both to represent them on a larger scale and to show how atoms are linked together to form molecules. Scientists use the term 'model' to mean any method of representing some structure or idea, and there is more than one way of representing a water molecule.*

> *Chemistry has its own convention for representing molecules and their constituent atoms. They often use circles (or spheres if making a three-dimensional model) to represent atoms and sometimes they use short, cylindrical rods between the circles (or spheres) to represent bonds that join one atom to another. For now, think of these bonds as a glue that holds the atoms together.*

Which statements are correct from the following list? Select one or more:

a. Molecules are made up of atoms.

b. There is only one kind of model used to represent molecules.

c. Chemical models use spheres to represent whole molecules.

d. Atoms within a molecule are held together by chemical bonds.

e. Chemical models use balls and sticks to represent molecules.

## Question 3

There is one grammatical or spelling error in each of the following sentences. Can you find all four errors and correct them?

Their are now over 1.5 million officially registered organisms on our planet.

These different life form's are known as species.

the total includes animals, plants and fungi, but not bacteria.

People r finding new species every year.

# Part 5: Can I think scientifically?

This section asks you to demonstrate that you have some general science skills – the ability to think critically and logically, and to ask the kind of questions that scientists ask themselves. These skills will be taught and developed during your study of S111, but prior knowledge and experience of using these skills will save you time, allowing you to complete the first two topics comfortably within your target of 16 to 20 hours of study per week. If you do not have these skills, you will need to spend a little more time than this.

## Question 1

This question tests your ability to observe physical events and draw valid conclusions. Choose the correct term in each statement below:

1. If you drop (not throw) a bouncy ball from a height onto a concrete floor it will / will not bounce back up to the same height.

2. Looking at a glass of water with a few ice cubes in it, I can tell that ice is more / less dense than water.

3. When lightning happens, sound is produced at the same time, which we hear as thunder. If you were told that light travelled faster than sound, you would expect to see the lightning before / after you heard the thunder.

4. If you stir a pan of baked beans as you heat it with a metal spoon, the handle becomes too hot. If you stir it with a wooden spoon, the handle does not become too hot. Therefore metal is a better / worse conductor of heat than wood.

## Question 2

Island chains of volcanoes occur above hot spots in the earth's crust. This question asks you to read several statements and put them in a logical order that explains how this process occurs. You do not need to know anything about geology to answer this question, it is about presenting information logically.

Here is the full set of statements, in a random order. Number each sentence to indicate their correct order, i.e. the position each statement should take if written as a consecutive paragraph.

- At the hot spot, magma breaks through the new section of crust now directly above it.

- When it meets the cold sea, the magma solidifies.

- At a geological feature known as a 'hot spot', hot molten rock called 'magma' rises up and breaks through the earth's crust, under the ocean.

- More and more magma comes out through the hole, making a mountain of volcanic rock under the sea.

- The plates which make up the earth's crust are moving very slowly. Eventually that part of the crust, with the undersea mountain (and its top, the island) moves away from the hot spot.

- Once the mountain is big enough, the top shows above the surface of the sea, which creates an island.

- A new undersea mountain starts to form above the hot spot, eventually creating a new island close to the previous one.

## Question 3

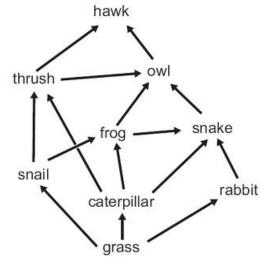This question is based on comprehension of the diagram and information provided.



Figure 1 A simplified food web

A food chain can be defined as sequence of feeding relationships between organisms, showing who eats what and thus the movement of energy through the feeding levels. When all the food chains in a habitat are joined up together they form a food web as shown in the diagram above (Figure 1). Although it looks complex, it is just several food chains joined together. Each arrow represents "eaten by".

For example, one food chain that includes four organisms in this web is:
grass eaten by > snail eaten by > thrush eaten by > hawk.

Say whether each statement below is true or false, based only on the information in Figure 1.

1. The caterpillars, snails and frogs are eaten by more than one organism in the web, but the thrushes and owls are only eaten by one.  True / False
2. The longest food chain in the web includes five organisms. True / False
3. Two types of organism are eaten by three different organisms. True / False
4. In this food web there is only one organism that is not a food source for another organism. True / False
5. Frogs have the greatest variety of food sources in this web.  True / False
6. Grass does not "eat" any other organism, it must therefore produce its own food forming the base of all the food chains in the web. True / False

## End of quizzes

Thank you for taking the time to complete these quizzes. The answers and feedback follow.

# Answers to quizzes

## Do I have enough time to study S111?

Please note that spending sufficient time studying is *the most important factor* in assessing your own chances of success on this module.

Because our entry is open to all, with or without previous qualifications, we know that some students will study at faster or slower rates than others. We have prepared the module with this in mind. If you have no previous study experience, or have not studied recently, you will need the full 20 hours a week to cover the core content. If you have a science and/or maths qualification already (for example a recent GCSE or A-Level) you may be able to cover the core content in rather less time, but we will provide additional content that you will find interesting and that may help you attain a higher (Distinction) grade for this module.

## Do I have enough computing experience to study S111?

There were 12 questions in the table. Calculate your score for this quiz simply by adding up the number of times you answer "yes".

### Score 10–12

Good news! On the basis of your answers to this quiz, your computing ability is sufficient to start S111.

### Score 6–9

As you answered 'no' to at least one of the questions about computing, you may wish to spend 6 hours working through the Using a computer for study module on OpenLearn before S111 begins. Although the Open University provides a wealth of guidance material on computing issues, including access to a 24-hour helpdesk for registered students, learning to use your computer for these simple tasks is not part of the S111 module and is therefore not covered by the 16–20 hours a week study allowance.

### Score <6

As you have answered 'no' to several of these questions about computing, you should spend 6 hours working through the Using a computer for study module on OpenLearn before S111 begins. Although the Open University provides a wealth of guidance material on computing issues, including access to a 24-hour helpdesk for registered students, learning to use your computer for these simple tasks is not part of the S111 module and is therefore not covered by the 16–20 hours a week study allowance.

## Are my maths skills good enough?

### Question 1 (award half a mark for each correct answer)

23.3479 rounded to
(i) two decimal places is 23.35 (because 7 is greater than 5 and so rounds up)
(ii) one decimal place is 23.3 (because 4 is less than 5 and so rounds down).
It is important to return to the original number to work out the second part of this question, and not continue to round based on your answer to part (i).

### Question 2 (award 1 mark for a correct answer)

Answer: 1030.972 grams (to 3 decimal places)

## Question 3 (award 1 mark for a correct answer)

The total cost of 9 litres of petrol = £ 12.33

## Question 4 (award 1 mark for a correct answer)

The chemistry teacher can order 80 test tubes (with 50 pence left over).

## Question 5 (award 1 mark for a correct answer)

12% of £3600 is £432.

## Question 6 (award half a mark for each correct answer)

Fraction $\frac{3}{4}$ = Decimal number 0.75 = Percentage 75%

## Question 7 (award half a mark for each correct answer)

The number of books read by Hala = 5
The total number of books read by the whole group = 35

## Question 8 (award 1 mark for a correct answer)

You will need 120 g of butter.

## Question 9 (award 1 mark for a correct answer)

Percentage = 41.6%

## Question 10 (award 1 mark for a correct answer)

The path is 4.717 kilometres long.

_____

## Score 8–10

Congratulations! Your maths skills are good enough to start S111. There is a significant maths component within S111, and being confident at maths will help your study.

## Score 6–8

As you had difficulty with one or two of these questions, you may wish to spend 12 hours working through the Basic science: understanding numbers module on OpenLearn (or equivalent maths tuition) before S111 begins.

We will provide links to revision material covering all these maths topics, within the module, as well as online tutorials, but note that revising maths at this 'essential' level will fall outside the recommended 16 to 20 study hours per week. Refreshing your skills now, before the module starts, will save you time later on.

There is a significant maths component within S111, and being confident at maths will help your study.

## Score 4–6

As you had difficulty with several of these maths questions, you must spend at least 12 hours working through the Basic science: understanding numbers module on OpenLearn (or equivalent maths tuition) before S111 begins.

We will provide links to revision material covering all these maths topics, within the module, as well as online tutorials, but note that revising maths at this 'essential' level will fall outside the recommended 16 to 20 study hours per week. Refreshing your skills now, before the module starts, will save you time later on.

There is a significant maths component within S111, and being confident at maths will help your study.

## Score <4

You scored less than a passing grade for this assessment.

If this is because you did not take it very seriously, please try the test again.

Otherwise, you are not ready to attempt S111 at present. You would be better advised to start with an Open University Access module, and you can find more details here.

## Is my English good enough?

### Question 1 (award 3 marks for a correct answer)

The sentence that gives you the most information and is clear and unambiguous is:

1. Water can exist in three phases: a solid phase called ice, a liquid phase called water, and a gaseous phase called water vapour.

### Question 2 (award 1 mark for each correctly selected statement)

The correct statements were:

a. Molecules are made up of atoms.
d. Atoms within a molecule are held together by chemical bonds.
e. Chemical models use balls and sticks to represent molecules.

### Question 3 (award 1 mark for each correct answer)

The grammatical or spelling errors in each of the following sentences were as follows:

*Their are now over 1.5 million officially registered organisms on our planet.*
'Their' should read 'There'.

*These different life form's are known as species.*
There should be no apostrophe in 'forms' in this context.

*the total includes animals, plants and fungi, but not bacteria.*
A sentence should start with a capital letter, i.e. 'The …'

*People r finding new species every year.*
Words should be spelt out in full: 'are' not 'r'.

_____

Your ability to read and understand English is already sufficient for you to study S111.

As you had difficulty with one or more of the English questions, you should spend 5 hours working through the Am I ready to study in English? module on OpenLearn before S111 begins.

If you have more time available, you might prefer to study the free, online, 8-week module English: skills for learning for which you will receive a digital badge and statement of participation.

Your English skills are insufficient for you to be able to study S111 easily. You should work to improve these before you register for this module.

You may be able to take a language class locally, or you may wish to study our free, online, 8-week module English: skills for learning for which you will receive a digital badge and statement of participation.

# Can I think scientifically?

## Question 1 (award one mark per correct answer)

The correct term is highlighted in each statement below:
1. If you drop (not throw) a bouncy ball from a height onto a concrete floor it ~~will~~ / will not bounce back up to the same height.
2. Looking at a glass of water with a few ice cubes in it, I can tell that ice is ~~more~~ / less dense than water.
3. When lightning happens, sound is produced at the same time, which we hear as thunder. If you were told that light travelled faster than sound, you would expect to see the lightning before / ~~after~~ you heard the thunder.
4. If you stir a pan of baked beans as you heat it with a metal spoon, the handle becomes too hot. If you stir it with a wooden spoon, the handle does not become too hot. Therefore metal is a better / ~~worse~~ conductor of heat than wood.

## Question 2 (award one mark per correctly numbered statement)

Here is the full set of statements, in the correct order.

1. At a geological feature known as a 'hot spot', hot molten rock called 'magma' rises up and breaks through the earth's crust, under the ocean.
2. When it meets the cold sea, the magma solidifies.
3. More and more magma comes out through the hole, making a mountain of volcanic rock under the sea.
4. Once the mountain is big enough, the top shows above the surface of the sea, which creates an island.
5. The plates which make up the earth's crust are moving very slowly. Eventually that part of the crust, with the undersea mountain (and its top, the island) moves away from the hot spot.
6. At the hot spot, magma breaks through the new section of crust now directly above it.
7. A new undersea mountain starts to form above the hot spot, eventually creating a new island close to the previous one.

## Question 3 (award one mark per correct answer)

1. The caterpillars, snails and frogs are eaten by more than one organism in the web, but the thrushes and owls are only eaten by one.  False (thrushes can be eaten by owls and hawks)
2. The longest food chain in the web includes five organisms. False (the longest includes six)
3. Two types of organism are eaten by three different organisms. True (grass and caterpillars)
4. In this food web there is only one organism that is not a food source for another organism. True (the hawk)

5. Frogs have the greatest variety of food sources in this web. False (Owls and snakes have more choice)
6. Grass does not "eat" any other organism, it must therefore produce its own food forming the base of all the food chains in the web. True

_____

## Score 17

Congratulations! You appear to have a scientific mind!

## Score 10–16

Well done. You scored over 60% in this science quiz and this suggests that you should be able to study S111 within the recommended 16 to 20 study hours per week.

You may wish to spend 15 hours working through the Water for life module on OpenLearn before S111 begins. We will cover all the science content from scratch within the module, but time spent in preparation now will save you time when the module begins.

## Score 7–9

You performed reasonably well in this assessment, but you have some preparation work to do if you wish to study S111 within the recommended study timetable (16 to 20 hours per week).

You should spend 15 hours working through the Water for life module on OpenLearn before S111 begins. We will cover all the science content from scratch within the module, but time spent in preparation now will save you time when the module begins.

## Score <6

You scored less than a passing grade for this assessment.

If this is because you did not take it very seriously, please try the test again.

Otherwise, you should not attempt S111 at present. You would be better advised to start with an Open University Access module, and you can find more details here.

# Finally…

Thank you for taking the time to complete these quizzes — hopefully you've learned a bit about whether S111 is right for you, and what preparations you may need to make before starting your study.

_____

# References

Using a computer for study: http://www.open.edu/openlearn/science-maths-technology/computing-and-ict/information-and-communication-technologies/using-computer-study/content-section-0 (Accessed 3 July 2017)

Basic science: understanding numbers: http://www.open.edu/openlearn/science-maths-technology/basic-science-understanding-numbers/content-section-overview (Accessed 5 July 2017)

Am I ready to study in English?: http://www.open.edu/openlearn/education/educational-technology-and-practice/educational-practice/am-i-ready-study-english/content-section-0 (Accessed 5 July 2017)

English: skills for learning: http://www.open.edu/openlearn/education-development/english-skills-learning/content-section-overview (Accessed 5 July 2017)

Water for Life: http://www.open.edu/openlearn/nature-environment/the-environment/environmental-studies/water-life/content-section-0 (Accessed 5 July 2017)