

# Unit 10 The Living Body: Contents

## Overview

### Lesson Plans

1 Introduction	17 Body systems X
2 Enzymes I	18 Body systems XI
3 Enzymes II	19 Body systems XII
4 Enzymes III	20 Body systems XIII
5 Enzymes IV	21 Nerves I
6 Enzymes V	22 Nerves II
7 Organs and organ systems	23 Nerves III
8 Body systems I	24 Nerves IV
9 Body systems II	25 The endocrine system I
10 Body systems III	26 The endocrine system II
11 Body systems IV	27 The reproductive system I
12 Body systems V	28 The reproductive system II
13 Body systems VI	29 The reproductive system III
14 Body systems VII	30 The reproductive system IV
15 Body systems VIII	31 The reproductive system V
16 Body systems IX	

### Assignment 10.1: Enzymes

Help Sheet 1.1: An investigation to compare biological and non-biological washing powders  
Help Sheet 1.2: Useful enzyme websites  
Help Sheet 1.3: Producing a poster on the uses of enzymes  
Help Sheet 2.1: The effect of temperature on the enzyme lipase  
Help Sheet 2.2: The effect of temperature on the enzyme lipase: results  
Help Sheet 2.3: Finding the best (optimum) pH for pepsin to digest protein  
Help Sheet 2.4: Results for finding the best (optimum) pH for pepsin to digest protein  
Task Sheet 1.1: An investigation to compare biological and non-biological washing powders  
Task Sheet 1.2 Washing powder advert storyboard  
Task Sheet 2.1: The effect of temperature on the enzyme lipase  
Task Sheet 2.2: What is the best pH for digesting protein?  
Task Sheet 3: Graph to show the effect of temperature on the enzyme lipase  
Checklist

### Assignment 10.2: Body systems

Help Sheet 1.1: Producing a poster of the digestive system  
Help Sheet 1.2: Model of digestion in the small intestine  
Help Sheet 1.3: Producing a PowerPoint presentation on digesting a beef burger  
Help Sheet 1.4: Heart dissection  
Help Sheet 1.5: The effect of exercise on pulse rate  
Help Sheet 1.6: Producing a report on the circulation system and the respiration system  
Help Sheet 1.7: Testing urine  
Help Sheet 1.8: Producing a poster of the renal system  
Task Sheet 1.1: Digestion  
Task Sheet 1.2: The respiratory system  
Task Sheet 1.3: The heart  
Task Sheet 1.4: Exercise breathing and heart rate  
Task Sheet 1.5: The kidneys  
Task Sheet 1.6: Testing urine  
Checklist

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**Assignment 10.3: Nerves**

Help Sheet 1: Investigating reflex actions  
 Help Sheet 2: Producing a poster of the nervous system  
 Help Sheet 3: Producing a report on disorders of the nervous system  
 Task Sheet 1.1: Investigating reflex actions  
 Task Sheet 1.2: The nervous system  
 Checklist

**Assignment 10.4: The endocrine system**

Help Sheet 1: Producing a handout on the endocrine system  
 Task Sheet 1.1: Endocrine glands  
 Task Sheet 1.2: Endocrine glands and hormones  
 Task Sheet 2: Endocrine glands and hormones  
 Task Sheet 3: Comparing and contrasting the nervous system and the endocrine system  
 Checklist

**Assignment 10.5: Reproductive system**

Help Sheet 1.1: Producing a poster of the reproductive systems  
 Help Sheet 1.2: Producing a poster about fertilisation and development of the foetus  
 Help Sheet 2: Producing a PowerPoint presentation on the menstrual cycle  
 Task Sheet 1.1: Female and male reproductive systems  
 Task Sheet 1.2: Functions of the male and female reproductive systems  
 Task Sheet 3: Fertility treatment using hormones  
 Checklist

**Worksheets**

- |  |                              |
|--|------------------------------|
| 1 Useful organ transplant and mechanical transplant websites | 12 Blood vessel drawings     |
| 2 Crack the enzyme code!                                     | 13 Wordsearch                |
| 3 Enzyme crossword   | 14 Crossword                 |
| 4 Enzyme wordsearch  | 15 Breaking the kidney code  |
| 5 Washing powder advert storyboard example                   | 16 Crossword                 |
| 6 Body organs  | 17 Wordsearch                |
| 7 Organ systems  | 18 Wordsearch                |
| 8 Wordsearch   | 19 Crossword                 |
| 9 Digestive system diagram                                   | 20 Male and female card sort |
| 10 Card sort   | 21 Crossword                 |
| 11 Card sort   | 22 Wordsearch                |

**Technician Sheets 1 – 9****Scheme of Work****Tracking Documents****Functional Skills and PLTS**

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## Overview

### Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

<b>P1</b> Outline the role of enzymes as catalysts	<b>M1</b> Explain the factors affecting the functions of enzymes	<b>D1</b> Analyse data to identify the optimal conditions of at least two parameters for the function of an enzyme	Lessons 1 to 6
<b>P2</b> Carry out investigations into the structure and functions associated with the digestive, respiratory, circulatory and renal systems	<b>M2</b> Explain the way the respiratory and circulatory systems interact to maintain cellular and body function	<b>D2</b> Explain the consequences for the human body when one of these systems fails	Lessons 7 to 20
<b>P3</b> Identify the components of a simple reflex arc	<b>M3</b> Describe the difference between the somatic and autonomic nervous system	<b>D3</b> Give possible causes of failure of the nervous system and explain the consequences	Lesson 21 to 24
<b>P4</b> Identify the function of the main endocrine glands	<b>M4</b> Describe the way hormones coordinate body functions	<b>D4</b> Assess the difference between the way hormones coordinate body functions and the way the nervous system coordinates body functions	Lessons 25 and 26
<b>P5</b> Identify the structure and functions of the male and female human reproductive system	<b>M5</b> Explain the process of hormonal control of the female reproductive cycle	<b>D5</b> Explain the way conception is controlled using replacement hormones	Lessons 27 to 31

## Introduction to this unit

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### Assignment 10.1: Lessons 1 to 6 (approximately 12 hours)

Students are working for a washing powder manufacturer. Students investigate the affect of temperature and pH on the efficiency of enzymes. They also research other uses of enzymes in industry. Once they have gathered all the information they produce a storyboard to show how they intend to advertise their biological washing powder. It will include a guide to the best ways to use the powder and it will also explain how the washing powder works. The storyboard will provide evidence for all levels. Evidence for P1 will be their conclusion from the experiment on washing powders. Evidence for M1 and D1 will come from practical investigations on finding the optimum pH and temperature for enzyme activity.

### Assignment 10.2: Lessons 7 to 20 (approximately 25 hours)

Students are training to become a fitness instructor. As part of their training they need to find out about how the body works. They will be expected to produce posters and leaflets to help them explain to their clients how their bodies work and why exercise and diet are important. In order to complete their posters and leaflets students will research the different body systems in a number of ways, including both practical investigations using their own bodies and the Internet. Evidence for the portfolio will include a PowerPoint presentation on the digestion of a beef burger and a poster of the digestive system (P2). A report on the effect of exercise on the respiratory and circulatory systems will provide evidence for both P2 and M2. Students will look at the effects of drugs and diet and produce a leaflet as evidence for D2.

### Assignment 10.3: Lessons 21 to 24 (approximately 8 hours)

Students are training to become a physiotherapist. As part of their training they need to find out about the nervous system. This is linked to the idea that they may have to treat patients with disabilities involving failures of the nervous system. Evidence from practical investigations and Internet research will be used to produce a poster about the nervous system and reflexes. This will be used as evidence for P3 and M3. Students will then research medical conditions that affect the nervous system, such as spinal damage and multiple sclerosis. They then produce a report as evidence for D3.

### Assignment 10.4: Lessons 25 and 26 (approximately 3 hours)

Students are working as a sister in a local doctor's surgery, dealing with patients that have hormone deficiencies. They need to understand the role of hormones in the body so that they can advise their patients. Students produce a handout that contains information about hormone deficiencies. The handout will provide evidence for all three levels.

### Assignment 10.5: Lessons 27 to 31 (approximately 9 hours)

Students are working for a family planning clinic giving advice about family planning. They will investigate the process of reproduction and how hormones are involved. Evidence for P5 will be a poster on the reproductive organs and fertilisation. A PowerPoint presentation on the menstrual cycle will provide evidence for M5. For D5 they will need to produce a leaflet on fertility treatment.

## 2 Enzymes I

### Learning outcome

LO1 Know the role of enzymes as catalysts

### Assessment criterion

P1 Outline the role of enzymes as catalysts

### Planning and resources

This lesson will take one to two hours depending on the ability of the group.

You will need the following resources:

- two pieces of cloth stained with ketchup
- non-biological washing powder
- biological washing powder
- two beakers labelled A and B
- stirring rod
- thermometer
- balance
- heating equipment, e.g. Bunsen burner, tripod and gauze and protective mat or kettle
- spatula
- measuring cylinder
- eye protection
- pictures of, or samples of, food made using enzymes, e.g. beer, cheese, yoghurt
- carton of fresh milk
- Student Book page 210
- Worksheet WS2 Crack the enzyme code!
- Worksheet WS5 Washing powder advert storyboard example
- Help sheet A10.1 HS1.1
- Task sheet A10.1 TS1.1
- Technician sheet 1
- (optional) Collins BTEC First Applied Science Interactive Book interactive presentation 'Enzyme mechanism'; Video 'Eating food' (02:25)

### Real-life links

If possible a visit to a local brewery or cheese-making facility would be helpful to students.

### Setting the scene

Introduce the idea of enzymes in everyday life by showing students pictures or samples of foods made using enzymes, e.g. cheese, wine, beer.

- Ask students to consider why enzymes are so important. Show students the milk and ask them what happens if it is left for too long out of the fridge. Discuss with students the idea that enzymes do the same thing but much quicker.

### Class activity

- Ask students to solve the code on **Worksheet WS2 Crack the enzyme code!**
- Discuss what is meant by an enzyme. Introduce the term 'catalyst'.
- Ask students to make a list of the enzymes used in digestion. This should have been covered in KS3, but a quick look at **Student Book** pages 212–215 will refresh their memory.

## Assignment activity

P1

In this lesson students work on **Task 1a of Assignment 10.1**.

- Ask students to follow the instructions on **Help Sheet A10.1 HS1.1**. They will be adding a biological powder and a non-biological powder to samples of stained cloth and will observe which one is cleaned best.
- Students can then record their results on **Task Sheet A10.1 TS1.1**.
- The lesson should then be finished by discussing the results of students' experiments and confirming the importance of enzymes.

### Teacher guidance

This lesson covers Pass criteria only.

Students can work together in pairs or small groups depending on the availability of equipment. Some students may find it easier to do one powder at a time. In which case you will need two hours to complete the lesson.

Tell students it is important to try and keep the water at about 40 °C. This can be done by simply adding small amounts of water from a kettle or by using a Bunsen burner.

It may be possible to complete the class activities while the cloth is in the water or while it is drying.

Students should complete **Task Sheet A10.1 TS1.1** independently, as this is used to assess P1.

Throughout this topic P, M and D students will be gathering information to include on their storyboard on **Task Sheet A10.1 TS1.2**. Students don't start work on their storyboards until Lesson 6, but you may want to give them **Worksheet WS5 Washing powder advert storyboard example** so they can see what needs to be included at each criterion.

### Delivering PLTS and functional skills

**PLTS** Team workers – working together to set up an experiment

**Functional skills** English – speaking and listening when taking part in a group discussion; reading instructions

### Useful websites

<http://www.ncbe.reading.ac.uk/ncbe/protocols/PRACBIOTECH/PDF/wash.pdf> – an alternative method of doing the investigation using photographic film

[http://www.theguardians.com/Microbiology/gm\\_mbg01.htm](http://www.theguardians.com/Microbiology/gm_mbg01.htm) – alternative method for the investigation

<http://isbibbio.wikispaces.com/Enzymes+in+Washing+powder> – explanation of what the enzymes in washing powders do and has useful links to other websites

## 9 Body systems II

### Learning outcome

**LO2** Be able to investigate individual body systems, relating their structure and functions to their role in maintaining health

### Assessment criterion

**P2** Carry out investigations into the structure and functions associated with the digestive, respiratory, circulatory and renal systems

### Planning and resources

This lesson will take one to two hours.

You will need the following resources:

- 15 cm length of Visking tubing
- 10 cm<sup>3</sup> starch solution (1%)
- 2 cm<sup>3</sup> amylase solution (1%)
- iodine solution (0.01 M)
- dropping pipette
- 100 cm<sup>3</sup> beaker
- thermometer
- reagent sticks (clinistix) or Benedict's solution
- test tube
- (optional) cotton to tie around the Visking tubing instead of knotting it
- kettle
- models of jaws from different animals
- pieces of bread
- Student Book pages 212–215
- Task Sheet A10.2 TS1.1
- Help Sheet A10.2 HS1.2
- Technician sheet 5

### Real-life links

It may be possible to engage a dentist to discuss with students the importance of our teeth and why it is important to maintain them.

### Setting the scene

Discuss with students why we need teeth.

- Show students some sets of teeth from different animals.
- Discuss with them why the teeth are different shapes and relate this to the animals' diets. Animals that eat meat have sharp canines to tear and slice their food. Plant-eating animals have large, flat molars to grind and chew grass for a long time.

### Assignment activities

P2

In this lesson students begin their work on Task 1b of Assignment 10.2.

Demonstrate the process of mechanical digestion.

- Ask the students to leave the lab briefly in order to chew on a piece of bread. Explain the reasons for not eating in the lab.
- Discuss with students what is happening to the bread in their mouths. Describe how the teeth are chewing the food to increase the surface area. The saliva mixes with the food to make it easier to digest. Chewing is an example of mechanical digestion.

- Students then need to complete question 1 on **Task Sheet A10.2 TS1.1**.

Recap with students what an enzyme is and what it does. Remind them of the names of the digestive enzymes they found out about in previous lessons. Discuss with them the action of the enzyme amylase that is found in the mouth. This is the enzyme that started to digest the bread they were chewing. If the bread is chewed for long enough it starts to taste sweet.

- Ask students to suggest a reason why the chewed bread becomes sweet. Explain to them that amylase converts starch into sugar. This is an example of chemical digestion. (We don't normally notice bread turning sweet in our mouths because it is not in our mouths for long enough.)
- Ask students to follow the instructions on **Help Sheet A10.2 HS1.2**. They will be adding amylase to starch inside Visking tubing. Explain to students that the Visking tubing has tiny holes that allow small sugar molecules through but not larger starch molecules. This is similar to the wall of the small intestine. The investigation demonstrates the need for large molecules to be digested before they can be absorbed.
- Tell students it is important to try and keep the water at about 40 °C. They must then record their results on **Task Sheet A10.2 TS1.1**.
- Students should carry out the investigation in pairs but answer the questions independently.
- The lesson should finish with a discussion of the results of their experiment. Ensure students understand the importance of the difference between mechanical and chemical digestion. Students can then answer questions 2 to 6 on **Task Sheet A10.2 TS1.1**.

### Teacher guidance

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#### Pass

- Students should be able to describe mechanical digestion in the mouth. They need to include detail about the action of the teeth and swallowing. The evidence for this is question 1 on **Task Sheet A10.2 TS1.1**.
- Students describe the importance of chemical digestion in order to change insoluble molecules into soluble molecules so they can be absorbed. The evidence of this is question 6 on **Task Sheet A10.2 TS1.1**.
- This information will then be used as part of Task 1b of Assignment 10.2.

### Delivering PLTS and functional skills

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**PLTS** Independent enquirers – identifying questions to answer and problems to resolve when investigating the various functions of the digestive system

Creative thinkers – asking questions to extend their thinking when discussing the functions of the digestive system; connecting their own and others' ideas and experiences when carrying out investigations

Team workers – taking responsibility, showing confidence in themselves and their contribution to practical work

**Functional skills** Speaking and listening – making a range of contributions to discussions

English – communicating information effectively, by writing the difference between mechanical and chemical digestion

### Useful websites

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[http://library.thinkquest.org/2935/Natures\\_Best/Nat\\_Best\\_High\\_Level/Digestive\\_Net\\_Pages/Digestive\\_page.html](http://library.thinkquest.org/2935/Natures_Best/Nat_Best_High_Level/Digestive_Net_Pages/Digestive_page.html)

– lots of useful information about digestion

[http://www.skool.co.za/Lessons/ks4/biology/digestion/digestion\\_part\\_1/launch\\_web.html](http://www.skool.co.za/Lessons/ks4/biology/digestion/digestion_part_1/launch_web.html) – an animation showing digestion

<http://yucky.discovery.com/flash/body/pg000126.html> – facts about digestion, telling the story of how a pizza is digested



**P1**  
(part)

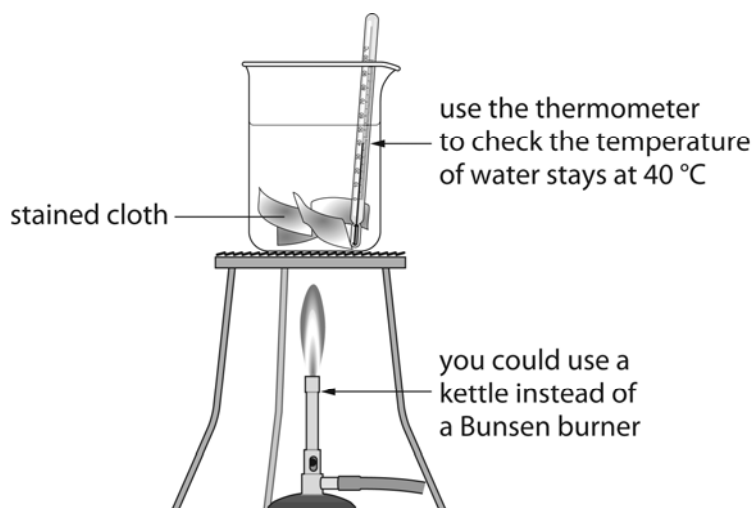
# Help Sheet 1.1

## An investigation to compare biological and non-biological washing powders

In this experiment you will compare a biological washing powder (that has enzymes) with a non-biological washing powder (that has no enzymes) to see how well they remove stains.

### You will need:

- two pieces of cloth stained with ketchup
- non-biological washing powder
- biological washing powder
- two beakers labelled A and B
- stirring rod
- thermometer
- balance
- heating equipment, e.g. Bunsen burner, tripod and gauze, protective mat or use of a kettle
- spatula
- measuring cylinder
- eye protection



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# Help Sheet 1.1

An investigation to compare biological and non-biological washing powders (continued)

## Method

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- 1 Measure out 5 g of biological washing powder. Put this into beaker A.
- 2 Measure out 5 g of non-biological washing powder. Put this into beaker B.
- 3 Add 100 cm<sup>3</sup> of water to each beaker.
- 4 Heat the water to 40 °C and stir to dissolve the washing powder. Your teacher will tell you how you are going to heat the water.
- 5 Add a piece of stained cloth to each beaker.
- 6 Leave the cloth to soak (try to keep the water at 40 °C).
- 7 After 20 minutes, remove the cloth and rinse in cold water.
- 8 Leave the cloth to dry.
- 9 Compare the cloth with a stained one that has not been washed.
- 10 Record how clean the cloth is by awarding it a mark from 1 to 10 (10 being completely clean).

**P1**  
(part)

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# Task Sheet 1.1

## An investigation to compare biological and non-biological washing powders

**P1**  
(part)

### Results

Record your results in the table below.

Washing powder	Appearance of cloth after 20 mins (marks 1–10, where 10 is completely clean)
biological	
non-biological	

### Conclusion

- Which of the washing powders, A or B, contained enzymes?  
.....
- Which washing powder was the best?  
.....
- Explain why you chose the washing powder in question 2 as the best one.  
.....  
.....  
.....
- What does this experiment tell you about why enzymes are used in biological washing powders?  
.....  
.....  
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