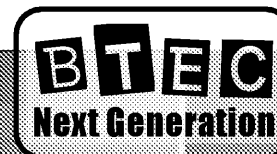


Teaching Pack

For BTEC First Award in Applied Science

Unit 7: Health Applications of Life Science

Second edition, 27th February 2015



POD 4720

science@zigzageducation.co.uk
zigzageducation.co.uk

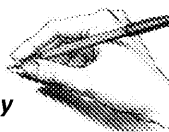
ZigZag is a large community of over 6000 teachers & educationalists.
Review new titles or publish your own work

Fancy being involved?

Then register at...

publishmenow.co.uk

The Professional Publishing Community



Alternatively email new resource ideas directly to...

publishmenow@zigzageducation.co.uk

Contents

Thank You for Choosing ZigZag Education	ii
Teacher Feedback Opportunity	iii
Terms and Conditions of Use	iv
Teacher’s Introduction	1
Suggested Scheme of Work	3
Lesson Plan 1: Principles, Characteristics and the Concept of a Healthy Balanced Diet	4
Balanced Diet Questions.....	8
Lesson Plan 2: The Impact of Exercise on the Health of the Human Body	10
Exercise Questions.....	13
Lesson Plan 3: Measures Taken to Improve the Health of the Population	15
Data Analysis Questions	19
Data Analysis and Evaluation Questions.....	22
Assignment A: Measures Taken to Improve the Health of the Population	24
Lesson Plan 4: Principles of the Immune System	27
Immune System Questions	29
Lesson Plan 5: Potential Advantages and Disadvantages of Vaccination	31
Vaccination Questions.....	35
Lesson Plan 6: Human Screening Programmes and their Advantages and Disadvantages	37
Screening Programmes Questions.....	39
Assignment B: The Immune System, Vaccinations and Screening Programmes	41
Lesson Plan 7: Principles of Antibiotics	44
Lesson Plan 8: Principles of Antifungals, Antivirals and Analgesics	48
Treatments for Disease Questions	50
Lesson Plan 9: Principles and Uses of Blood Groups, Blood Transfusions and Organ Donation	53
Organ Donation and Blood Transfusions Questions	55
Lesson Plan 10: Medical Advances and the Principles and Uses of Stem Cell Therapy	57
Medical Advances Questions.....	60
Assignment C: Principles and Uses of Treatments for Illness	61
Answers to Questions	64

Teacher's Introduction

This unit is taught over 30 guided learning hours (GLH). Teachers will have different approaches to the balance between teaching and working on assignments, as well as when they carry out assignment work. This scheme of work suggests splitting the time into ten teacher-taught hours, eight assignment lessons and 12 spare lessons for additional assignment time to obtain missed assessment criteria and also catch-up time for students who have missed lessons or need extra support. For differentiation purposes, information that only distinction-level students need is marked in a box with a **D** symbol. 'Did you know' boxes are included to give students some fun extra information about the topic – they do not need to know this information to complete their assignments.

This pack contains the following materials:

1. A single-page overview scheme of work
2. Ten lesson plans
3. Notes for each lessons covering all the learning aims between them
4. Questions in non-write-on and write-on formats to reinforce learning, with answers
5. Assignments covering all the assessment criteria between them

This resource is designed to be flexible in the following ways:

- Proposed assignments tasks have been put into suggested slots after the relevant material has been covered.
- The assignments provided in this pack are designed to be independent of each other so that any one can be substituted if you have a preferred assignment from elsewhere.
- For each lesson there is a lesson plan followed by student notes and questions. Questions are then repeated provided in write-on format. You could use the material in one of the following ways:
 1. Use the notes to support your classroom teaching and then hand out either the non-write-on questions or the write-on questions at the end of the lesson (possibly for homework).
 2. Use the notes to supplement your own notes or the textbook and hand them out at the end of the lesson as a summary with the questions so students can complete the questions using the notes as support.
 3. Just use the questions (either write-on or non-write-on as appropriate) at the end of the lesson and subsequently hand out the notes at revision time.

If using this resource for assessed work, then as with all BTEC assignments they must be **internally verified**. You must also check suitability with the board* and follow the **important disclaimer notice below**.

* Note: Pearson BTEC / Edexcel currently offer a free Assignment Checking Service.

IMPORTANT DISCLAIMER REGARDING ASSESSMENT: If you choose to use the assignments in this resource for assessed work, it is your responsibility to internally verify them and to check with Edexcel that the material you use is suitable. This includes the requirement from September 2014 not to conduct 'interim assessment' within a Learning Aim. You should **not** use the material in this resource for actual assignments unless you have checked their suitability with Edexcel. The awarding body specifies the level of support that students can be given and you **must** check the level of support given in this pack is appropriate to meet these needs and as necessary **adjust and use the resource appropriately to meet these requirements**. Please check for the most up-to-date information from Edexcel at: <http://www.edexcel.com/btec/Pages/default.aspx> Note that relevant paperwork for practical work, such as observation sheets, should also be obtained from Edexcel. Assignment details and requirements from the awarding bodies sometimes change after their initial published requirements and so you must check that the resource material here is in line with the latest requirements **before use**.

Also available from ZigZag Education

Assignment Pack

Three more sets of assignments for the new BTEC specification to give you a larger choice of assignments.

For more information please visit:
www.zzed.co.uk/btecassignments

Also available from ZigZag Education

Activity Pack

Worksheet-style activities, starter and plenaries matched to the new BTEC specification to supplement this pack and the textbook and give more variety and different approaches.

Practical sheets:

- Teacher sheets for all the suggested practicals and demonstrations for this unit.
- Student method sheets for all the practical experiments outlined in this scheme of work with observation grids.
- Health and safety guidance for demos and practicals.

For more information please visit:
www.zzed.co.uk/btecactivities

Update (July 2014)

- A new 'Important Disclaimer Regarding Assessment' has been added in the introduction.

Update: Second edition (February 2015)

- Following changes to BTEC assessment rules which affect learners registered from 1st September 2014, this resource has been amended to meet these rules by removing the 'Date resubmitted' boxes from all assignment briefs (pages 24, 41, 62)
- In addition, to meet current assessment rules, the following essential changes have been made:
 - Assignment briefs have been edited so they each cover one Learning Aim in full. Therefore:
 - Assignments 1 and 2 have been merged and edited (pages 24, 25)
 - Assignments 3 and 4 have been merged and edited (pages 41, 42)
 - Assignments 5 and 6 have been merged and edited (pages 61, 62)
 - The Scheme of Work and Teacher's Introduction have been amended accordingly (pages 1, 3)
 - Text aimed at students does not refer to Level 1 tasks or criteria (pages 24, 25, 26, 41, 42, 43, 61, 62, 63)
 - Each assignment task allows students to access the full range of grades (pages 24, 25, 41, 42, 61, 62)
- The following other amendments have been made:
 - Assignments have been renamed to be consistent with the Learning Aims. Therefore:
 - Merged assignments 1 and 2 have been renamed Assignment A (page 24)
 - Merged assignments 3 and 4 have been renamed Assignment B (page 41)
 - Merged assignments 5 and 6 have been renamed Assignment C (page 61)

Free updates

Register your email address to receive any future free updates* made to this resource or other Science resources your school has purchased, and details of any promotions for your subject.

Go to zzed.co.uk/freeupdates

** resulting from minor specification changes, suggestions from teachers and peer reviews, or occasional errors reported by customers*

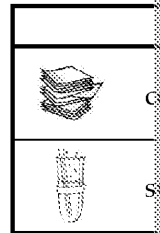
Suggested Scheme of Work

GLH	LP	Title
1	1	Principles, characteristics and the concept of a healthy
2	2	The impact of exercise on the health of the human bod
3	3	Measures taken to improve the health of the populati
4-5	<i>*Assignment A: Measures taken to improve the health of the popu</i>	
6	4	Principles of the immune system
7	5	Potential advantages and disadvantages of vaccinatio
8	6	Human screening programmes and their advantages a
9-11	<i>*Assignment B: The immune system, vaccinations and screening</i>	
12	7	Principles of anti-infection
13	8	Principles of anti-fungals, antivirals and analgesics
14	9	Principles and uses of blood groups, blood transfusio
15		Medical advances and the principles and uses of stem
16-18	<i>Assignment C: Principles and uses of treatments for illness</i>	
19-30	<i>**Opportunity for catch-up and obtaining missing assignment cr</i>	



Learning Aims Note

'All students should' aims are levelled at Level 1 and Pass students, 'most students should' aims are levelled at Merit students and 'some students should' aims are levelled at Distinction students.



Sugg
 * = assign
 ** = oppo
 obta

INSPECTION COPY

INSPECTION COPY



**COPYRIGHT
PROTECTED**



Lesson Plan 1: Principles, Characteristics and Healthy Balanced Diet

Learning Aims






All students should:	Understand the importance of a balanced diet. Identify a balanced diet for teenagers. Describe the possible effects of diet on the func
-----------------------------	---

Key words: balanced diet, food groups, calories, recommended daily intake

Starter

Ask students to write down what they ate yesterday.

Main

1. Review  students ate the day before. Classify items the items they ate.
2.  Introduce the concept of a balanced diet, what a balanced diet consists of (fats, carbohydrates, proteins, vitamins and minerals) and how to eat a balanced diet. Introduce the concept of recommended daily intake (RDI).
3. Ask students to bring in one day's worth of clean food wrappers from the lesson.
4. Ask students to consider what a balanced diet for a teenager might compare to an athlete's diet.
5.  Discuss the effects of overeating and undereating. This also provides a class discussion about eating disorders in general. Care must be taken to ensure that no one may know someone who has had an eating disorder.
6.  Ask students to answer Questions 1–4 in the pack.
7. Go over the answers.
8.  Energy content of different foods experiment: students should read the mass of a food sample, add it to a boiling tube and record the temperature using a thermometer. Measure and record the mass of a food sample, light it using a Bunsen burner underneath the water trap for 10 seconds until the sample has burned. Then record the final temperature of the water and calculate the energy using the following equation (note that 1 cm³ of water has a mass of 1 g). *Remember to advise students to wear safety goggles at all times and to wear aprons.*

$$\text{Energy in food (kcal)} = \frac{\text{Mass of water(g)} \times \text{Temperature change (}^\circ\text{C)}}{\text{Mass of food sample(g)}}$$

Plenary

True or false: Ask students a series of true or false statements about balanced diets. Move to either end of the room to vote.

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Principles, Characteristics and the Components of a Healthy Balanced Diet

What is a balanced diet and why is it important?

An important part of leading a healthy lifestyle is eating a **balanced diet**. A balanced diet consists of the right amounts of the following vital food groups: **proteins, carbohydrates,**

Components of a Balanced Diet

Proteins – Found in foods such as meat, eggs, cheese, nuts and seeds. They are broken down to provide the body with the molecules it requires for growth and repair.

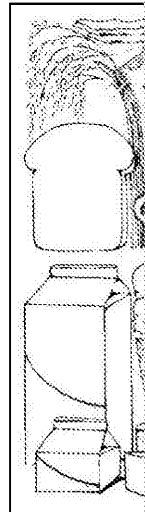
Carbohydrates – Found in foods such as bread, pasta and rice. They are broken down to release energy as sugars. This food group provides a great deal of energy and any excess energy taken in is stored as fat.

Fats – Found in foods such as dairy foods and meats. Fats come in two types: un-saturated and saturated. They are good for you in small amounts as they provide the body with essential fatty acids and are a concentrated source of energy. Essential fatty acids such as omega-3 can be found in oily fish and flax seeds.

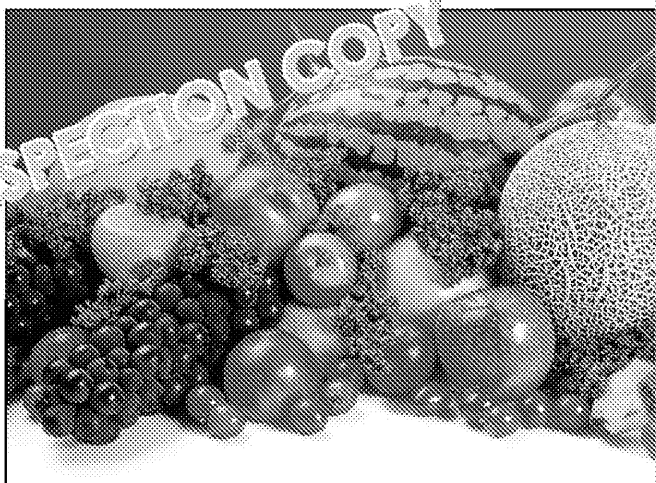
Vitamins and minerals – Vitamins and minerals are found in fruit and vegetables in large amounts. They are required for healthy functioning of the body.

A balanced diet needs to contain a wide range of different foods to ensure you get all the nutrients your body needs. A balanced diet consists of:

- **Plenty of...** fruits, vegetables and carbohydrates such as potatoes, bread, pasta
- **Some...** milk and dairy products, meat, fish, eggs and other sources of protein
- **Small amounts of...** foods high in fat or sugar



Components of a balanced diet



Fruit and vegetables are important components of a balanced diet

INSPECTION COPY

COPYRIGHT
PROTECTED



Why do different people require different amounts of energy?

The food we eat provides our bodies with the energy we need to function. The energy is measured in a unit called the **calorie (kcal)**.

Different people require different amounts of energy depending upon their **age** and their level of **activity**. For example:

- A teenager needs more energy than someone elderly because they are growing (they need protein especially to create new cells) and are likely to be more active. Elderly people have a low energy requirement as they are usually less active.
- An athlete requires more energy than somebody who does little exercise because they do more exercise, so their muscles require more energy to work.



The number of calories required by an average teenager is:
2,755 calories per day for young men aged 15 to 18
2,110 calories per day for young women aged 15 to 18

If we add up the number of calories we eat per day, we can calculate if we need to cut down on the amount we eat and exercise more; or perhaps we need to increase our calorie intake to meet our energy requirements.

Food Item	Energy (kcal)
1 beef burger	
1 portion of baked chips (130g)	
baked potato	
cheddar cheese	
rice (1 cup)	
slice of bread	
margherita pizza	
packet of crisps	
broccoli	
green beans	
baked beans	
tomato	
banana	
orange	
Snickers	
semi-skimmed milk	

Recommended Daily Intake (RDI)

The recommended daily intake (RDI) is the average daily dietary intake level that is sufficient to meet the energy requirements of approximately 98% of the healthy individuals in a particular life stage and gender group.

Energy (kcal)	RDI values
Protein (g)	
Carbohydrate (g)	
Fat (g)	

Nutritional Information on Foods

Many food products have nutritional information printed on them, so it's easy to see how many calories we are consuming or how much protein/carbohydrate/fat we are consuming and adjust our diet accordingly.

Food	Fat (g)
Bread	2.9
Butter	82.3
Cheese	34.6
Milk	3.5
Banana	0.4

**COPYRIGHT
PROTECTED**



Eating Disorders and Dietary Imbalance

Overeating

Eating more food than the body requires for energy (overeating) leads to weight gain and ultimately leads to **obesity**. Obesity has many causes, including increasingly sedentary modern lifestyles, increased availability of unhealthy 'fast foods' and psychological factors.

The World Health Organisation predicts that there will be 700 million obese adults in the world by the year 2031.

Obesity can cause a variety of health problems including high blood pressure, type 2 diabetes and a higher risk of heart attack. Some of these conditions will be discussed in more detail.



Diagram represents
of a person
b) over

Undereating

Undereating is consuming a diet that is lower in energy than the body requires for weight loss and can have serious health complications due to **malnourishment**. The body does not receive the correct amount or proportion of nutrients to function.

There are two particular conditions associated with undereating – anorexia and bulimia.

Anorexia

Anorexia is an eating disorder and mental health condition. People who suffer with it are obsessed about what they eat. They may feel that they are fat, even when they are not, or are becoming fat. Those with the condition try to keep their weight as low as possible. They might obsessively count calories and do too much exercise. Treatment for this condition involves psychological therapy and advice on eating and nutrition.

Bulimia

Bulimia is another eating disorder and mental health condition, though in this instance it involves eating vast amounts of high calorie food in a short space of time (binge eating) and then making up for it by vomiting or using laxatives to maintain a certain weight. Again, like anorexia, treatment involves psychological therapy and advice on eating and nutrition.

Did you know?

Low levels of certain vitamins can lead to conditions such as anaemia, a disease that causes you to feel constantly tired due to the lack of iron carried around the body.

INSPECTION COPY

COPYRIGHT
PROTECTED



Balanced Diet Questions

1. List the components of a balanced diet.
2. Why does an athlete require more energy than somebody who does less?
3. Why does a teenager require more energy than somebody elderly?
4. Copy out the following sentences and fill in the gaps:
Obesity is a disease caused by _____. Obesity increases the risk of _____ or _____. On the other hand, under-eating can lead to _____. It is not advisable to eat a _____ diet.
5. Describe how eating disorders can cause health problems.
6. How would someone suffering from anorexia or bulimia be treated?
7. Write one day's diet plan for a person of your choice. Also write a short paragraph including how old they are, what job they do and their hobbies. Explain your choice of diet.

INSPECTION COPY



INSPECTION COPY

COPYRIGHT
PROTECTED



Lesson Plan 2: The Impact of Exercise on the Human Body

Learning Aims




All students should:	<p>Explain the importance of a balanced diet and exercise.</p> <p>Identify a balanced diet for teenagers.</p> <p>Describe the possible effects of diet and exercise on the human body.</p> <p>Develop a diet and exercise plan based on level appropriate nutritional balance to promote health.</p>
Most students should:	<p>Explain how the diet and exercise plan will affect the human body.</p>
Some students should:	<p>Evaluate the diet and exercise plan and justify their choices.</p>

Key words: positive and negative impacts of exercise, weight loss, exercise

Starter

Review of previous lesson – the importance of eating a balanced diet. Ask students to identify sources of carbohydrate, protein, fat and vitamins & minerals.

Main

- Review starter answers.
-  Discuss the positive and negative effects of exercise, exercise intensity and exercise guidelines.
- Discuss diet plan and exercise regimes with students and ask them to refer to the pack to list the important components of a diet and exercise plan.
- Group discussion on why students think that these components are important, the content taught, and how they will affect the functioning of the body.
- Ask students to calculate the number of calories they consumed in one week and the wrappers they should have brought in from home. Ask students to calculate the calories they burnt from exercise and calculate their total energy intake.
-  The effects of exercise on the circulatory and respiratory systems. The changes in their pulse rate and breathing rates before and after exercise can be measured by counting the number of heart beats for 10 seconds and give the heart rates in beats per minute (b.p.m.). Breathing rate can be measured by counting the number of breaths taken in one minute. Students can then measure their pulse rates followed by their breathing rates after 30, 60, 90 and 120 seconds of vigorous exercise and compare the values.
-  Answer Questions 1–4 from the pack.

Plenary

Ask students to decide if the following statements are true or false:

- Exercise increases stress (false).
- Exercise helps us to lose weight (true).
- When we exercise regularly our heart and lungs get smaller (false).
- Exercise helps us strengthen muscles that can prevent back pain (true).

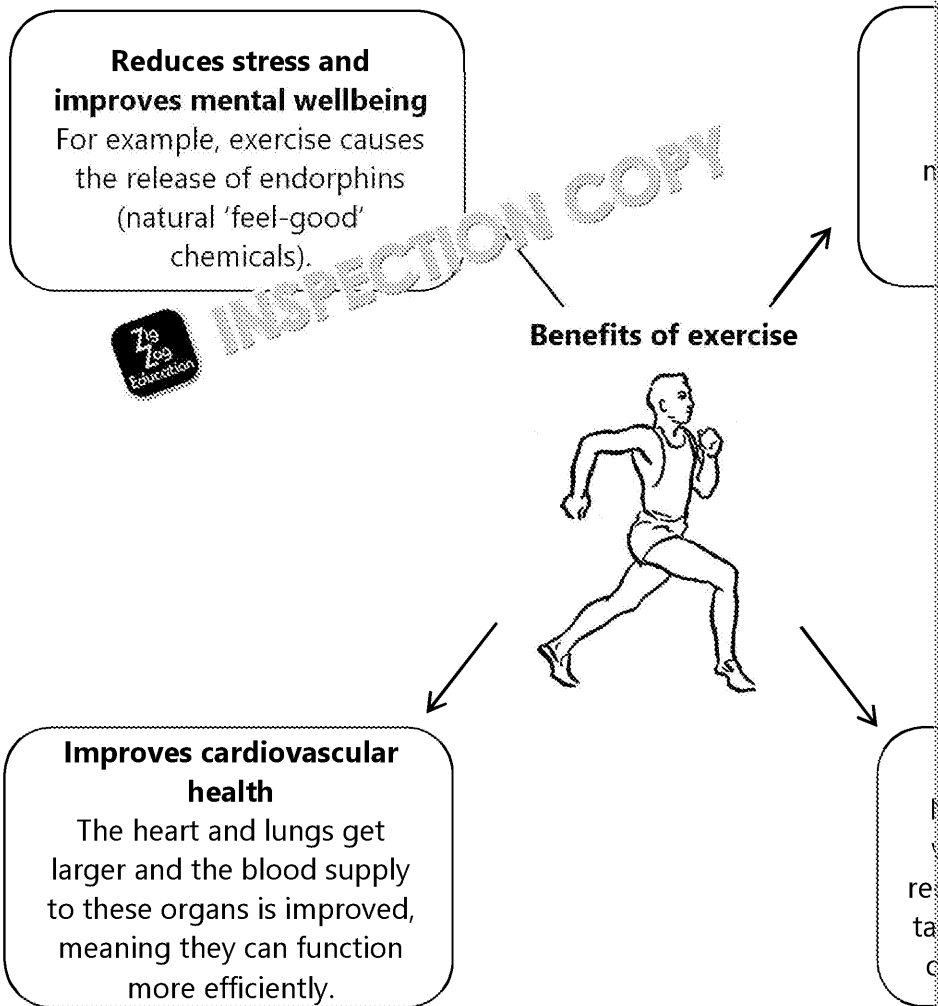
INSPECTION COPY

**COPYRIGHT
PROTECTED**



The Impact of Exercise on the Health of the

Exercise is just as important as eating a balanced diet when it comes to staying healthy. It helps to burn off any extra energy we may have in taken through eating too much. It also helps to improve the health of the heart and lungs. The benefits of doing regular exercise are illustrated in the spider diagram below.



However, too much exercise can have negative effects on the body, for example it can lead to dehydration and muscle fatigue.

Energy requirements during exercise for a teenager of a healthy weight and a person who is overweight

Activity	Energy used (kcal per hour)	
	Teenager of a healthy weight	Person who is overweight
Cycling	357	436
Playing football	429	872
Running	610	906
Swimming	310	632
Walking	181	305
Dancing	262	490

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Exercise Intensity

Exercise can be divided according to intensity, which refers to how much energy

Moderate Intensity Exercise

Moderate intensity means that you are working hard enough to raise your heart rate a little and break a sweat.

Moderate intensity physical activities include:

- walking to school
- walking the dog
- rollerblading
- cycling on flat ground

Vigorous Intensity Exercise

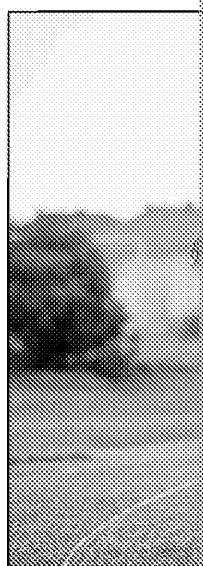
Vigorous intensity means that you are working very hard and your heart rate increases considerably and fast.

Vigorous intensity physical activities include:

- running
- gymnastics
- energetic dancing
- football



Walking is an example of a moderate intensity physical activity



Running is an example of a vigorous intensity physical activity

D

Exercise guidelines

The government has produced guidelines on the amount of exercise that you should do each day/week.

- For **5–18 year olds** the guidelines recommends 60 minutes of physical activity per day. This should be a mixture of moderate intensity exercise such as fast walking and vigorous intensity exercise such as running.
- For **adults** the recommended amount of exercise is reduced to 30 minutes per day for 5 days per week.
- For the **over 75s** the recommended amount of exercise, providing they have no health complaints that limit mobility, is two hours and 30 minutes per week.

People who are trying to lose weight may need to do more than the recommended amount of exercise in order to lose weight, and will also need to modify their diet.

Assignment tip: If you are working towards a distinction in your assignment, you should be able to justify, with reasons, why you have chosen your diet and exercise plan and be able to justify, with reasons, why you have chosen your diet and exercise plan. You should relate your plan to factors such as age and lifestyle choices such as

**COPYRIGHT
PROTECTED**



Diet Plans and Exercise Regimes

An example of a three-day exercise regime and a one-day diet plan for a

Exercise regime

Monday	Tuesday	Wednesday
Swimming for 30 minutes <i>Calories burned: 316</i>	Walking for 1 hour <i>Calories burned: 305</i>	Running <i>Calories</i>
Cycling for 30 minutes <i>Calories burned: 218</i>	Dancing for 30 minutes <i>Calories burned: 245</i>	Football <i>Calories</i>
Total calories burned: 534	Total calories burned: 550	Total calories

Diet plan

Meal	Item	Food groups
Breakfast	cheese sandwich	protein/carbohydrate
	banana	fruit/vitamins/fiber
	glass of semi-skimmed milk	fat/protein
Lunch	ham sandwich	carbohydrate/protein
	salad	vegetables/vitamins
	tomato soup	vitamins/minerals/carbohydrate
Dinner	cod (1 portion)	protein
	chips (1 portion)	carbohydrate
	broccoli	vegetables/vitamins
	green beans	vegetables/vitamins
Snacks	apple	fruit/vitamins/fiber
	fruit smoothie	fruit/vitamins/fiber
	orange	fruit/vitamins/fiber
	mixed nuts (1 bag)	protein/fat
		Total number of food groups

Exercise Questions

1. What are four positive effects of regular exercise?
2. How can exercise help someone who is overweight?
3. What is the difference between moderate intensity exercise and vigorous intensity exercise?
4. How much physical activity should a teenager do per day? What intensity of exercise should they do?

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Exercise Questions

1. What are four positive effects of regular exercise?

- 1
- 2
- 3
- 4

2. How can exercise help someone who is overweight?

.....
.....

3. What is the difference between moderate intensity exercise and vigorous intensity exercise?

.....
.....
.....

4. How much physical activity should a teenager do per day? What intensity of activity should they do?

.....
.....
.....

INSPECTION COPY

INSPECTION COPY

COPYRIGHT
PROTECTED



Lesson Plan 3: Measures Taken to Improve the Health of the Population

Learning Aims






All students should:	Identify the measures taken to improve the health of the population. Describe the ways in which health improvements can improve the health of the population.
Most students should:	Analyse rates of disease in the population in relation to lifestyle choices.
Some students should:	Evaluate measures taken to improve the health of the population.

Key words: obesity, smoking, alcohol, government measures, five-a-day, alcohol guidelines

Starter

Review the previous lesson. Ask students to write down the four benefits of a healthy lifestyle.

Main

- Go over starter exercise.
-  Discuss the effects of unhealthy lifestyle choices – poor diet, smoking, alcohol – from students.
-  Describe the diseases associated with poor lifestyle choices and their prevalence rates in the population.
-  Ask students to answer the 'Data Analysis' Questions in the pack.
- Class mindmap on the board about what the Government has done to encourage people to lead healthier lifestyles.
-  Ensure all government measures have been covered in brainstorm.
-  Ask students to answer the 'Data Analysis' and 'Evaluation' Questions.
- Students should attempt the 'Formative Learning' task at the end of the lesson as homework.

Plenary

Ask students what questions would elicit the following answers:

- The answer is five-a-day. What is the question?
"How many portions of fruit and vegetables does the government recommend?"
- The answers are: lung cancer, bronchitis and cardiovascular disease. What is the question?
"What are the diseases associated with smoking?"
- The answer is 3–4 units. What is the question?
"What are the recommended guidelines for a man's maximum daily alcohol consumption?"

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Measures Taken to Improve the Health of

Medical advances in recent decades (some of which will be covered later in this unit) mean that people are living longer. A growing population means that health care costs for the public are increasing; therefore, it is important for the population to be encouraged to lead healthy lifestyles.

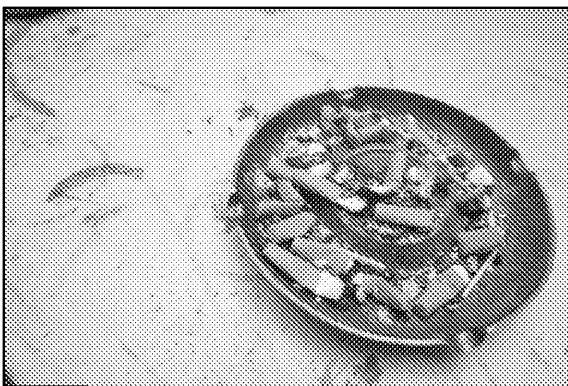
Unhealthy Lifestyle Choices

Poor Diet

As we have already seen, poor diet and lack of exercise means that people have a tendency to become overweight. Busy lifestyles may increase our reliance on convenient fast foods instead of home prepared foods and this can be very damaging to our health due to the fat and calorie content of such foods. The World Health Organisation has predicted that, by 2015, there will be 2.3 billion overweight adults in the world. Being overweight leads to a number of health complications so it is important that people are encouraged to eat a healthy diet consisting of the right amounts of each food group and the correct number of calories for their age and activity level.



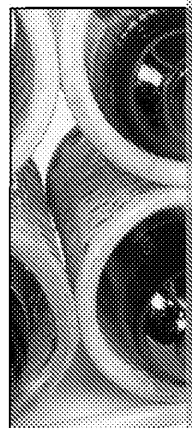
Smoking



An increasing body of evidence links smoking to lung cancer. Smokers also suffer from other health complaints including bronchitis. It is not just the smokers themselves who suffer from these negative health complaints but also the people who are close to them. They can damage their own health. This is because the smoke from the cigarettes can be inhaled by the people who are close to the smoker.

Excessive Alcohol

Smoking is not the only unhealthy habit that can lead to health problems. Alcohol consumption is another important factor that should be considered when examining the health of the general population. Long-term excessive consumption of alcohol can lead to liver disease, cancer and addiction.



INSPECTION COPY

COPYRIGHT
PROTECTED



Illnesses Associated Unhealthy Lifestyle Choices

Type 2 Diabetes

Type 2 diabetes is a condition in which a person is unable to control the sugar levels in their blood. People who are **overweight** are at greater risk of developing type 2 diabetes. Symptoms include increased thirst, frequent urination, tiredness and weight loss. However, symptoms can be controlled by eating a healthy diet and exercising regularly to keep sugar levels low.

Lung Cancer

Lung cancer is strongly linked to **smoking**. It is the third most common cause of death in the UK. Cancer occurs when cells in the lungs grow uncontrollably and form a lump known as a tumour. Symptoms of lung cancer include a persistent cough, shortness of breath, feeling weak and more tired than usual, and chest infections that won't clear even with treatment.



Right: A radiograph showing a tumour in the left lung of someone with lung cancer

Bronchitis

Bronchitis is also an illness associated with **smoking**. It is an infection that causes inflammation of the bronchial tubes. Symptoms include a cough which produces green mucus, a sore throat, wheezing, and chest pain.

Cardiovascular Disease

Cardiovascular disease is a collection of conditions including angina (chest pain), heart failure, and heart attacks are caused by narrowing of blood vessels due to the build-up of plaque. Symptoms of cardiovascular disease include chest pain, shortness of breath, and fatigue. A person developing cardiovascular disease include **smoking, physical inactivity, and poor diet**.

Liver Disease

Liver disease is caused by **excessive alcohol** consumption. The liver is the organ that filters toxins, including alcohol, from the blood. Each time the liver removes alcohol from the blood, it becomes damaged. Symptoms of liver disease include yellow looking skin (a condition known as jaundice), weight loss and loss of appetite. Continued alcohol abuse may eventually result in liver failure.

INSPECTION COPY



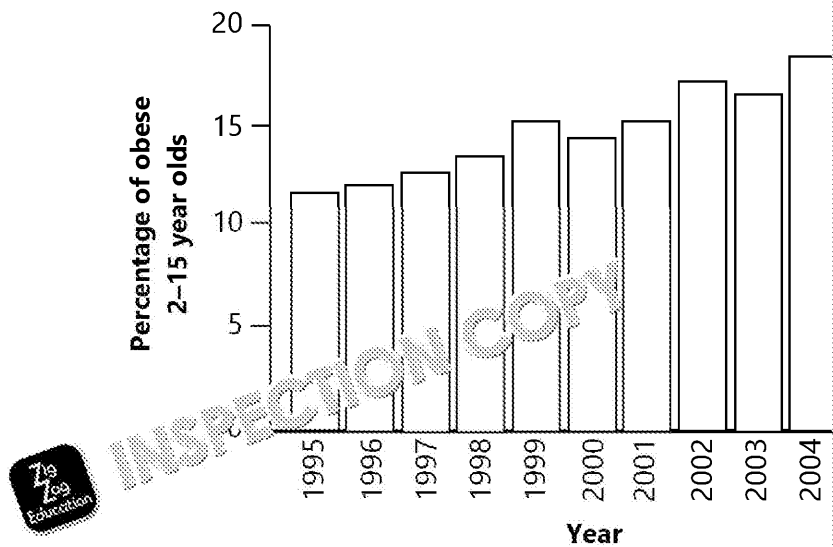
INSPECTION COPY

COPYRIGHT
PROTECTED



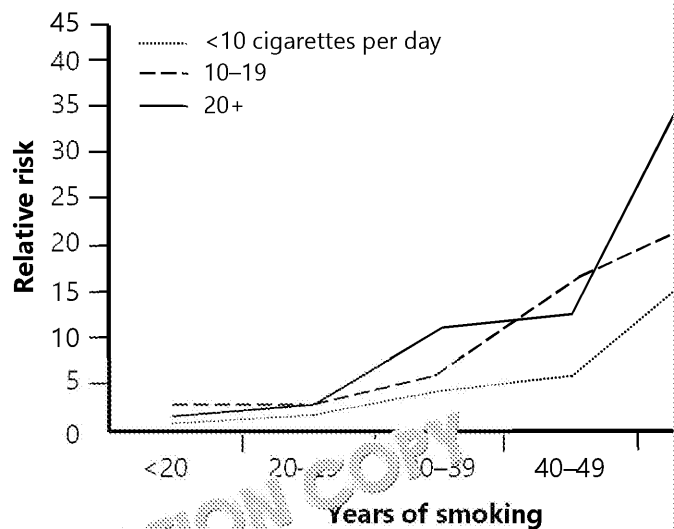
The Statistics

Graph 1: Childhood Obesity



Graph showing the rise in cases of childhood obesity (a) in England between 1995 and 2005.

Graph 2: Smoking and the Risk of Lung Cancer



Graph showing how the risk of developing lung cancer increases with the number of years of smoking for and the number of cigarettes he smokes

INSPECTION COPY

COPYRIGHT
PROTECTED



Data Analysis Questions

To answer these Questions you will need to refer to the graphs on page 19.

1. In general, what happened to the number of childhood obesity cases in 2005?
2. Why do you think this trend in the data exists?
3. Look at graph 2 on the information sheet and complete the following
smokes for, the greater the...
4. What advice would you give to a man who smokes based upon the ev



INSPECTION COPY



Data Analysis Questions

To answer these Questions you will need to refer to the graphs on page 19.

1. In general, what happened to the number of childhood obesity cases in 2005?
.....
2. Why do you think this trend in the data exists?
.....
.....
3. Look at graph 2 on the information sheet and complete the following
smokes for, the greater the...
.....
4. What advice would you give to a man who smokes based upon the ev
.....
.....



INSPECTION COPY

COPYRIGHT PROTECTED



Government Measures

The UK government has introduced a series of measures to encourage the general public to adopt healthier lifestyles. It is hoped that these measures will help to raise awareness about lifestyle choices and the non-infectious diseases they can cause and influence people to make healthier lifestyle choices.

Improving our diets: five-a-day keeps the doctor away

In 2003, the government launched its five-a-day campaign encouraging people to eat five portions of fruit or vegetables a day as part of a healthy, balanced diet.

This measure is aimed to improve diets and reduce the rates of obesity in the population.

Extinguishing smoking

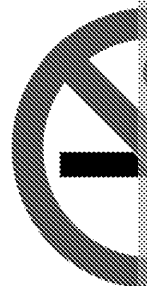
In 2003, European Union legislation ruled that all cigarette packets in the UK must have a warning printed on them: 'Smoking kills' or 'Smoking seriously harms you and others around you'.

In 2007, a smoking ban was introduced in the UK prohibiting the smoking of cigarettes in public places. The government also launched an anti-smoking television advertising campaign, highlighting the health effects of smoking such as cancer.

These measures are intended to deter people from smoking and reduce the number of people who smoke to reduce the rates of smoking-related diseases.



A warning on the side of a cigarette packet



The no-smoking sign was banned in public places in the UK

Reducing alcohol consumption

Guidelines have been published for the recommended maximum daily unit consumption: 3–4 units per day and for women 2–3 units per day (a unit of alcohol is equivalent to 10ml of pure alcohol, or a third of a pint of beer).

This measure is intended to reduce alcohol consumption and the rates of alcohol-related diseases.

INSPECTION COPY

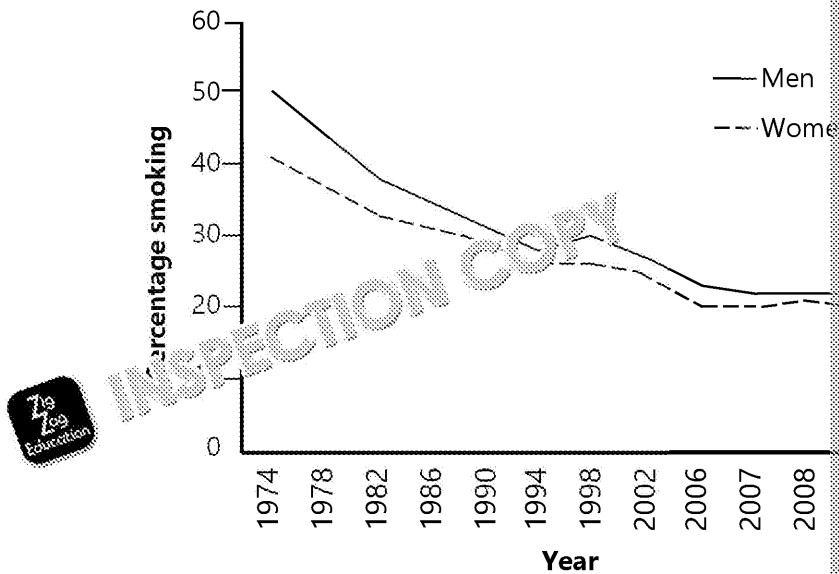
COPYRIGHT
PROTECTED



D

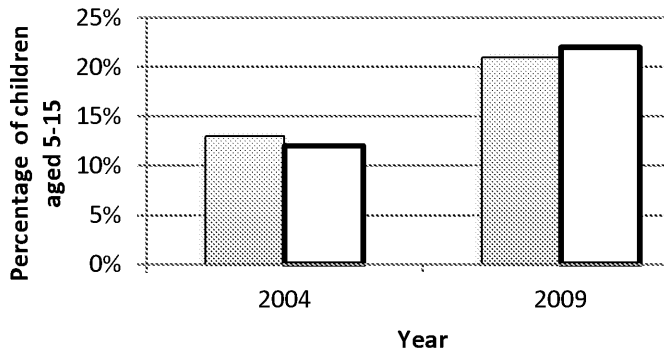
Are the measures having any effect?

Graph 1



Graph showing the percentage of the UK population that smoked between 1974 and 2008

Graph 2



Graph showing the percentage of children aged 5-15 that consume five or more portions of fruit or vegetables in 2004 and 2009

Furthermore in 2009 it was reported that one third of men and women recommended five-a-day.

Assignment tip: If you are writing towards a distinction in your assignment, the lifestyle choices that impact our health such as unhealthy eating, smoking suggest the Government or other organisations have tried make people do. You should also be able to suggest ways these schemes have been successful but improved or way to encourage more people to take part.

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Data Analysis and Evaluation Questions

To answer these Questions you will need to refer to the graphs on page 22.

1. Look at graph 1. What has happened to the numbers of people over the 1974?
2. What do you think is responsible for this trend?
3. Look at graph 2. Describe what has happened to the percentage of children a-day since the introduction of the five-a-day scheme by the government?
4. Reflect on your answers to the above questions. Write a paragraph to improve the health of the population in relation to the different lifestyle. Do you think the government should take measures to encourage people to eat healthily? To what extent do you think this?
5. **Further Your Learning Activity:** Imagine you are working for the British Heart Foundation. You have been given the task to produce a leaflet to encourage teenagers to lead a healthy lifestyle. Use the information on this sheet and do your own research in books and on the internet. Your leaflet should talk about the benefits of doing exercise and the importance of eating a healthy diet. You should also mention the negative effects of smoking and alcohol.

INSPECTION COPY



INSPECTION COPY

COPYRIGHT
PROTECTED



Data Analysis and Evaluation Questions

To answer these Questions you will need to refer to the graphs on page 22.

1. Look at graph 1. What has happened to the numbers of people over the 1974?

.....

2. What do you think is responsible for this trend?

.....

3. Look at graph 2. Describe what has happened to the percentage of children who eat five-a-day since the introduction of the five-a-day scheme by the government.

.....

4. Reflect on your answers to the above questions. Write a paragraph to improve the health of the population in relation to the different lifestyle. Do you think the government measures to encourage people to eat healthily have been successful? To what extent do you think this?

.....

.....

.....

.....

.....

.....

.....

5. **Further Your Learning Activity:** Imagine you are working for the British Dietetic Association. You have been given the task to produce a leaflet to encourage teenagers to lead a healthy lifestyle. Use the information on this sheet and do your own research in books and on the internet. Your leaflet should talk about the benefits of doing exercise and the importance of eating a healthy diet. You should also mention the negative effects of smoking and alcohol.

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Assignment A: Measures Taken to Improve the Health of the

Learner's name:

Start date:

Deadline:

Da

Measures Taken to Improve the Health of the

Scenario

You are working as a dietician and an overweight teenage boy is referred to you. He has been eating unhealthily and is confused about what he should eat to be healthy. You are designing a diet plan for him and giving him advice on the importance of a balanced diet and regular exercise.

As well as seeing patients, you have been researching the measures that the UK government has introduced to encourage the population to live healthy lifestyles. Your head of department has asked you to write an article about your findings to be published in a scientific magazine.

Task 1

First design a diet plan for an overweight teenage boy and give him advice on a balanced diet and regular exercise. Then write an article for a scientific magazine about the measures the government has introduced to encourage the population to live healthy lifestyles.

This assignment will also give you the opportunity to demonstrate your maths skills.

For the diet plan:

Write a balanced diet plan and exercise regime for your patient for a week. The plan must contain all the information your patient needs to follow the plan, improve his diet and lose weight.

Remember to include balanced food groups in the plan and consider the number of portions using recommended daily intake values. When designing the exercise regime, recommend the frequency and type of exercise that your patient should take that is appropriate for him.

Next, you decide that the most effective way to give your patient advice on the importance of a balanced diet and regular exercise is to give him an advice sheet that he can refer to. Write the advice sheet and remember to include:

1. Why people need to eat a balanced diet and take regular daily exercise.
2. A description of how balanced diet and exercise affects how the body works. *You should also describe what could happen if someone doesn't eat a balanced diet and under-eating and their effects on the body.*
3. How the diet and exercise plan that you have designed will affect the function of the body. *You should discuss the positive effects of eating healthy foods and taking regular exercise and how the plan will make your patient feel and how his health will be improved.*
4. An evaluation of the diet plan and exercise regime, and a justification of the choices of foods and activities in the plan. *Remember to explain why the foods and activities you chose are appropriate for your patient's age and lifestyle. Also look at your diet and exercise plan critically and think about how you can improve it. Include these improvements at the end of the leaflet so your patient can improve himself when undertaking his new plan.*

INSPECTION COPY

COPYRIGHT
PROTECTED



For the article:

1. Introduce your article with a list of the specific measures that the UK government has introduced to improve the health of the population. Remember to include all the measures in your article.
2. Discuss why the government has introduced these measures and describe them in relation to their potential effects on the rates of non-infectious disease.
You could discuss the negative effects of smoking, drinking alcohol and eating unhealthy food. Measures are intended to encourage people to live healthier lifestyles in relation to these factors.
- 3a. Research the rates of non-infectious disease in the population in relation to these factors. What are the rates of these diseases in the population at the moment?
- 3b. Then examine and analyse your research in your article. Does your research show a link between certain lifestyle choices and non-infectious disease? Remember to discuss the choices you discuss in your article.
4. Conclude your article with an evaluation of the government measures you have discussed in the article. Have the measures been successful at encouraging people to live healthier lifestyles? Have the measures affected the rates of non-infectious disease?
Remember to look at your research critically and explain why you have drawn your conclusions. Discuss how the measures have been successful or not, and how they could be improved.



INSPECTION COPY

**COPYRIGHT
PROTECTED**

Learner's name:	Start Date:
Learner's declaration: I certify that the work submitted for this assignment is my own. I have clearly referred to sources of work. I understand that false declaration is a form of malpractice.	
Learner's Signature:	Date:
Learner's comments for the assessor:	

Teacher's/assessor's name:

		Marking Criteria
Task:	Criteria	Learner must:
1	2A.P1	Describe the possible effects of diet and exercise on the functioning of the human body.
	2A.P2	Develop a diet and exercise plan based on level and type of exercise and appropriate nutritional balance, to promote healthy living for an individual.
	2A.M1	Explain how the diet and exercise plan will affect the functioning of the human body.
	2A.D1	Evaluate the diet and exercise plan, and justify the menus and activities chosen.
	2A.P3	Describe the ways in which health improvement measures are intended to improve the health of the population.
	2A.M2	Analyse rates of disease in the population in relation to lifestyle choices.
	2A.D2	Evaluate measures taken to improve the health of the population.

Deadline:

Summative feedback:

Date assessed:

Internal verifier's name:

Internal verifier's feedback:

Date:

If a learner has not met the Level 2 criteria, they can be assessed on the Level 1 criteria:

1A.1	Explain the importance of a balanced diet and exercise.
1A.2	Identify a balanced diet for teenagers.
1A.3	Identify measures taken to improve the health of the population.

**COPYRIGHT
PROTECTED**



Lesson Plan 4: Principles of the Immune System

Learning Aims





All students should:	Identify the role of the immune system in defence. Describe how the immune system defends the body against non-specific immune responses.
Most students should:	Compare the different defence mechanisms that protect the human body.

Key words: immune system, physical barrier, chemical defence, non-specific immune response, inflammation, phagocytosis, antibodies

Starter

Make a list of the ways in which our bodies stop bacteria from getting inside us.

Main

-  Talk about what the immune system is and what it consists of including physical, chemical defences and specific and non-specific responses, and how they work.
-  Emphasise the differences between the specific and non-specific immune responses.
- Show the following You Tube video clip on the immune response.
<http://www.youtube.com/watch?v=lrYIZjiuf18>
-  Ask students to answer Questions 1–5 in the pack.
-  Go over the answers to the questions and ask students to attempt the

Plenary

- Choose a student; ask them to explain how mucus helps to protect us.
- Choose another student; ask them to explain phagocytosis.
- Choose another student; ask them to explain the differences between specific and non-specific immune responses.

INSPECTION COPY

COPYRIGHT
PROTECTED



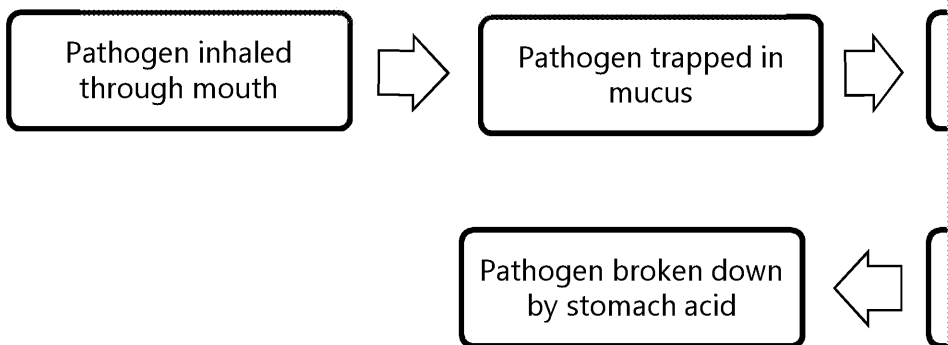
The Principles of the Immune System

The immune system is the body's mechanism for protecting itself from disease. It prevents you from falling ill, either by stopping pathogens from entering the body, or killing them once they are inside. It functions through a combination of **physical barriers**, **chemical defences** and notably white blood cells.

Firstly, disease-causing microbes known as **pathogens** (e.g. bacteria, fungi, viruses) enter the skin.

If the skin is damaged or cut, a blood clot forms that eventually becomes a scab, preventing pathogens from entering the body. This is another example of a physical barrier.

If pathogens arrive in the airways via inhalation, the insides of the respiratory system work to stop them. Mucus traps pathogens and is either moved out of the body through coughing or if mucus is swallowed, the pathogens trapped within it are killed by acid in the stomach. This is a **chemical defence**.



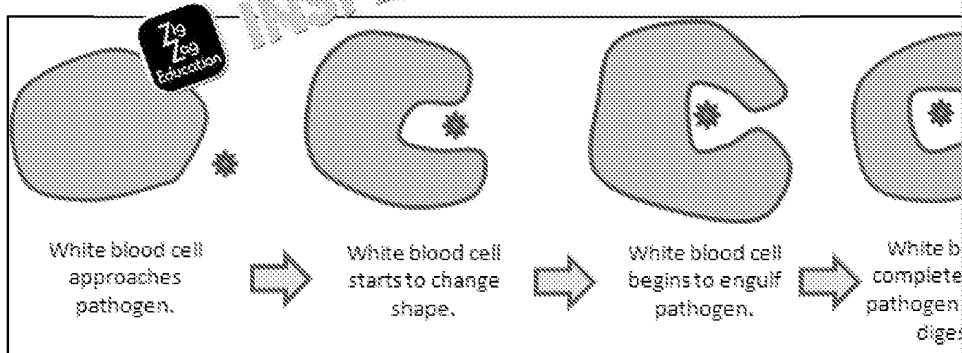
The Non-Specific Immune Response

The non-specific immune response is a basic and first response to infection that occurs before the body has identified the pathogens. Both chemical defence and physical barriers are non-specific responses.

Inflammation is an example of a non-specific immune response and can be recognised by symptoms such as redness, swelling and warmth in the affected area. These symptoms appear because the blood vessels are dilating (getting bigger) to allow white blood cells to reach the pathogen.

Some pathogens are engulfed by pathogen-eating white blood cells. Once inside the cell, the pathogen is digested and destroyed. This process is known as **phagocytosis**.

Physical barriers and chemical defences are both non-specific as they are not specific to any one pathogen.



Phagocytosis – A non-specific immune response

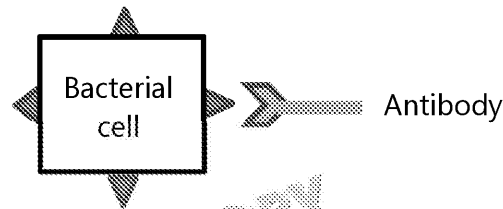
INSPECTION COPY

COPYRIGHT
PROTECTED



The Specific Immune Response

Special molecules called **antibodies** are produced by some types of white blood cells. They target one **specific** pathogen. They bind to the bacterial cell and act like a signal for a non-specific response, attracting them to target and destroy these cells through



The binding of an antibody to a bacterial cell

A Comparison of the Immune Responses

Physical Barrier vs Chemical Defence

Physical barriers work **outside** the body to prevent pathogens from getting in, while chemical defences work **inside** the body, protecting us when the pathogen enters our body.

Non-Specific vs Specific Immune Responses

Both involve white blood cells. However, the non-specific immune response acts against a range of pathogens, while the specific response acts against **specific** pathogens. The specific immune response involves the production of antibodies, while the non-specific response involves phagocytosis and inflammation.

Immune System Questions

1. What is the immune system? What is its role?
2. What provides a physical barrier to microbes?
3. Define 'phagocytosis'.
4. Describe the specific immune response.
5. Draw a table to compare the immune responses.
6. **Further Your Learning Activity** Using the Internet and books, investigate what happens when a white blood cell reacts when it meets a specific pathogen. Use your findings to create a classroom display.

**COPYRIGHT
PROTECTED**



Immune System Questions

1. What is the immune system? What is its role?

.....
.....
.....

2. What provides a physical barrier to microbes?

.....

3. Define 'phagocytosis'.

.....
.....

4. Describe the specific immune response.

.....
.....

5. Draw a table to compare the immune responses.

6. **Further Your Learning Activity:** Using the Internet and books, investigate how the immune system reacts when it meets a bacterial pathogen. Use your findings to create a presentation for your classmates.

INSPECTION COPY

COPYRIGHT
PROTECTED



Lesson Plan 5: Potential Advantages and Disadvantages of Vaccination

Learning Aims






All students should:	Identify how a vaccine aids in defending the body. Describe the changes in the human body following vaccination.
Some students should:	Evaluate the effectiveness of vaccination programmes.

Key words: vaccinations, how vaccines work, the body's immune response to vaccines, MMR, vaccine controversy

Starter

Recap previous lessons. Ask students to write definitions of the following words: **pathogen**, **antibody**, **phagocytosis**.

Main

1. Go over starter exercise.
2.  Explain the use of vaccines, what they are and what effect they have when injected.
3. Ask students if they have heard of the MMR vaccine. Do they know what the vaccine scare associated with it?
4.  Describe the MMR vaccine, the diseases it treats, and how and why it is used.
5.  Explain the importance of the MMR vaccine controversy and how it was resolved. Discuss principles, manipulation of data, conflict of interest etc.
6.  Students should examine the graphs. Can they explain what they show? Why did the number of people who stopped people from having vaccinations and consequently the number of cases of disease increase?
7.  Ask students to answer Questions 1–5 from the pack.
8. Go over the answers to the questions and ask students to complete the activity with a partner.

Plenary

Are the following statements true or false?

1. The MMR vaccine causes autism (false).
2. A vaccine contains active pathogen (false).
3. Vaccines boost our natural immune system (true).

INSPECTION COPY

COPYRIGHT
PROTECTED



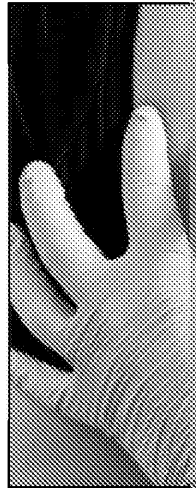
Vaccinations

A vaccination is an injection given as a precautionary measure against disease.

How Vaccines Work

Vaccines contain just enough bacteria/virus to activate the body's immune system, but not enough to make the recipient ill. In other words they boost the natural immune system. Vaccinations can be considered a form of artificially acquired immunity. Immunity is the ability to prevent illness and resist disease.

The bacteria/virus contained in the vaccine is dead, inactive or weakened. The idea is that when the body has met a particular pathogen, it recognises it, and removed it from the body by producing antibodies against it, it will be capable of recognising and removing the pathogen far more quickly the second time around. This is because the body keeps some of the antibodies it has created in a store ready for use the next time it meets the same pathogen. This greatly reduces the risk of the patient becoming ill with the disease.



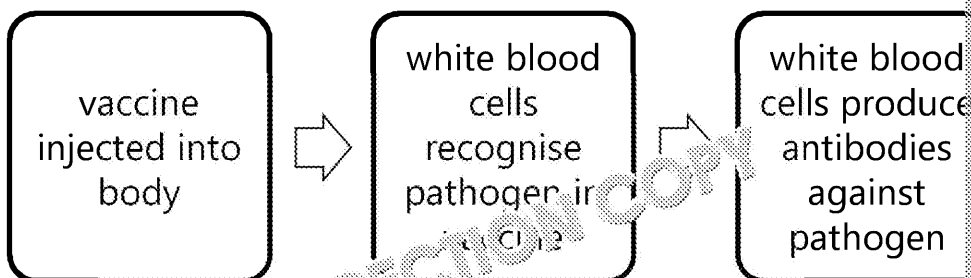
A person

Did you know?

The discovery of vaccinations began with a man called Edward Jenner.

During the eighteenth century, smallpox was the most infectious disease in Europe. It was spread by dairy maids who, after suffering from cowpox, were immune to smallpox. A vaccine against smallpox using cowpox and by 1980, smallpox had been eradicated.

The Body's Response to Vaccination



COPYRIGHT
PROTECTED



D

Advantages and Disadvantages of Vaccination

Advantages of vaccination	Disadvantages of vaccination
<ul style="list-style-type: none">• Saves millions of lives.• Reduces the spread of pathogens in the population.• Has eradicated some diseases such as smallpox.	<ul style="list-style-type: none">• Risk of adverse reactions.• Less effective against some diseases with high mutation rates.• Some vaccines take a long time to develop.• Some vaccines are created using live pathogens which may have mutated.• Some vaccines will not protect against all strains of a disease.

Case Study: The MMR Vaccine

The MMR vaccine is a vaccine that targets three diseases at once: measles, mumps and rubella.

- **Measles** – A highly infectious viral disease characterised by a red-rash and fever.
- **Mumps** – Also a contagious viral infection. Mumps is characterised by a rash on either side of the face.
- **Rubella** – A viral infection also characterised by a rash on the skin, similar to measles. This disease can be serious if a woman contracts it during pregnancy, resulting in deafness or even brain damage in the development of the baby, resulting in deafness or even brain damage.

Key Facts about the MMR Vaccine

- The vaccine was introduced in 1988.
- Since its introduction the vaccine has helped numbers of children who develop measles to fall to an all-time low.
- The first dose is given to a child shortly after their first birthday.
- It is given via injection into the muscle of the upper arm or thigh.
- Some children may develop side effects including a mild form of measles or a rash.

MMR Vaccine Controversy

In 1998, a scientist called Andrew Wakefield published a study that claimed a link between the MMR vaccine and autism. Autism is a disability that affects a person's ability to communicate with the people and world around them.

Since he published his study, there have been many larger studies underpinning his controversial theory has since been disproven. Furthermore, investigations found him guilty of **misconduct**. He withheld results that contradicted his theory. He was being paid by a British legal company to find a link between the MMR vaccine and autism. This represents a **conflict of interest**. In August 2010, the medical journal in which he published his study withdrew his work.

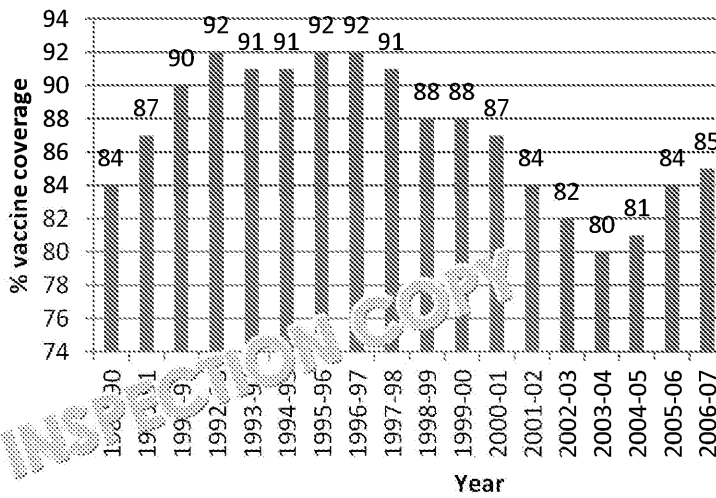
Unfortunately, the study and associated media hype stopped many parents from vaccinating their children and cases of measles, mumps and rubella began to rise. The page illustrates the sharp rise in the number of cases of measles between 1998 and 2000. This increase is thought to be linked to the vaccine scare.

INSPECTION COPY

COPYRIGHT
PROTECTED

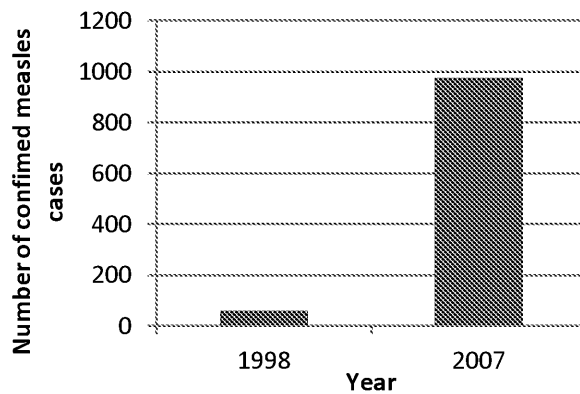


Graph 1



Graph showing the percentage of children in the UK that received the MMR vaccine by the age of 2 years

Graph 2



Graph showing the number of confirmed measles cases in the UK

Assignment tip: If you are working towards a *distinction* in your assignment, three screening programmes and one education programme, and evaluate how reducing illness, for example, through these, they have been taken up by a vast majority they have been successful at reducing infection and death rates.

For the evaluation part of your assignment, remember to write a balanced answer, listing advantages and disadvantages.

COPYRIGHT PROTECTED



Vaccination Questions

1. What do vaccines contain?
2. How do our bodies respond to vaccination?
3. What are the advantages and disadvantages of vaccinations?

To answer Questions 4 and 5 you will need to refer to the graphs on page 34.

4. Look at Graph 1. Describe what happened to the number of children taking the vaccine from 1998 onwards. Can you think of a reason for this?
5. Look at Graph 2. What happened to the number of measles cases in the UK from 2000 and 2007? Why do you think this may have occurred (refer back to your notes on vaccines)?
6. **Further Learning Activity:** With a partner, use the Internet and investigate the role of vaccines and their effectiveness. What is the role that they have been effective at preventing disease?

INSPECTION COPY



INSPECTION COPY

COPYRIGHT
PROTECTED



Vaccination Questions

1. What do vaccines contain?

.....

2. How do our bodies respond to vaccination?

.....

.....

3. What are the advantages and disadvantages of vaccinations?

Advantages

.....

Disadvantages

.....

To answer Questions 4 and 5 you will need to refer to the graphs on page 34.

4. Look at Graph 1. Describe what happened to the number of children that received the measles vaccine from 1998 onwards. Can you think of a reason for this?

.....

.....

.....

.....

.....

5. Look at Graph 2. What happened to the number of measles cases in the UK between 2000 and 2007? Why do you think this may have occurred (refer back to your notes on page 34)?

.....

.....

.....

.....

6. **Further Your Learning Activity** Working in pairs, use the Internet and investigate the role of different vaccines and their effectiveness. What is the role that they have and how effective at preventing disease?



**COPYRIGHT
PROTECTED**



Lesson Plan 6: Human Screening Programmes and Disadvantages

Learning Aims




All students should:	Identify screening programmes. Describe the role of specific health screening programmes.
Most students should:	Discuss the advantages and disadvantages of a screening programme.
Some students should:	Evaluate the effectiveness of human screening programmes.

Key words: screening programmes, cancer screening, prostate cancer screening, antenatal screening, Down's syndrome, new born screening, PKU, vascular disease

Starter

A student plays the teacher. Ask one student to go over what was taught in the last lesson. Then ask other students questions relating to the last lesson.

Main

-  Introduce what screening programmes are, the different types of screening available and why they are used.
-  Describe each screening programme in detail. Emphasise the advantages and disadvantages of each.
-  Ask students to answer Questions 1–4 from the pack and attempt to answer them. Draw attention to the top tip star that offers guidance for answering the questions.
- Go over the answers to Questions 1–4.
- Discuss the ethical implications of screening programmes, e.g. the fact that other family members finding out information they did not want to know, discrimination from employers and the refusal of insurance companies to cover existing conditions.
- If there is time remaining, ask students to do their own research on diabetes using the Internet. Details of diabetes can be found in the 'further information' section of the content for this lesson.

Plenary

Quick quiz on today's lesson content

- What is a screening programme?
- Name a screening programme.
- Give an advantage of one particular screening programme.
- Give a disadvantage of one particular screening programme.

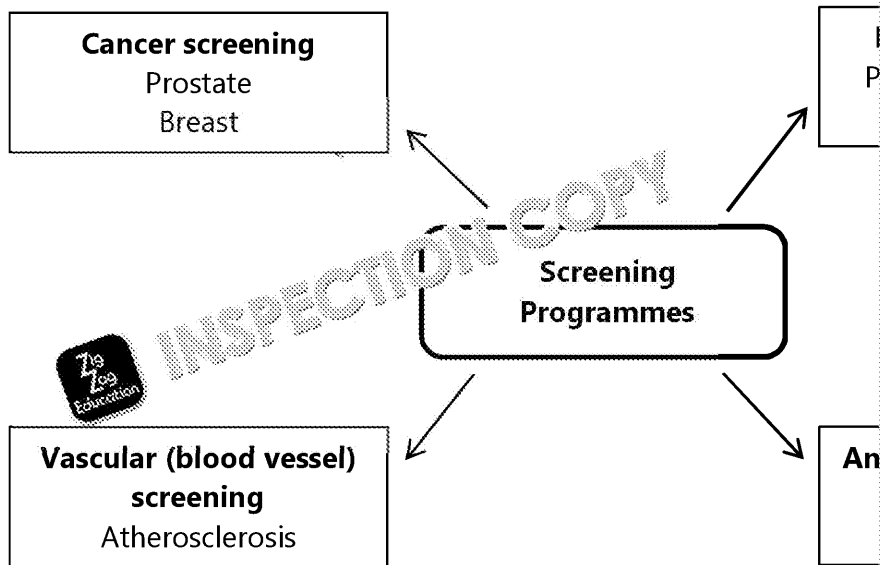
INSPECTION COPY

COPYRIGHT
PROTECTED



Screening Programmes

The purpose of screening programmes is to identify diseases in patients who do



Breast Cancer Screening

This screening programme is for women aged 50 and over. The test involves taking the advantage of this screening test is that it allows breast cancer to be detected in its early stages before symptoms become apparent. The earlier cancer is detected, the more successful the treatment. A disadvantage is that some women find the procedure painful. Furthermore, X-ray mammography carries a small cancer risk in itself; however the dose of radiation received during this screening is very low. It is generally believed that the benefits outweigh the risks.

Prostate Cancer Screening

Prostate cancer is the most common cancer in men in the UK. There is currently no routine screening programme in the UK but there is a test available called the PSA test. The disadvantage is that it can cause anxiety for the patient that may be unnecessary. However, if cancer is caught in early stages, treatment can begin and it is likely to be more successful.

Antenatal Screening for Down's syndrome

Antenatal screening is a screening before birth. Down's syndrome is a genetic condition that is currently not curable. Screening for the condition involves a blood test and ultrasound. It is not a definitive diagnosis and the diagnostic tests can result in miscarriage. An advantage of the programme is that if a woman is found to be carrying a baby with Down's syndrome, she can be offered special counselling and support to help them to come to terms with the situation.

INSPECTION COPY

COPYRIGHT
PROTECTED



Screening for Phenylketonuria (PKU) in Newborn Children

This screening test is to check for a chemical required for normal growth and development. If not present in the body, it leads to a build-up of the chemical that it is responsible for. This can lead to brain damage. The test is a simple blood test. Blood is obtained by pricking the heel with a needle and collecting the blood droplets. Little risk is involved but the child must be kept on a special diet. The advantage of this test is that babies identified to have PKU can be put on a special diet to prevent the disease from being caused.

Vascular Screening Programmes

Screening for atherosclerosis is helpful in the prevention of cardiovascular disease. People who are most at risk. This includes the elderly, people with diabetes and smokers. Atherosclerosis is a condition of the large blood vessels. Tests for atherosclerosis may include blood cholesterol, blood pressure checks and the measurement of weight and waist size. The risk of developing cardiovascular disease is thought to be high. There are no particular treatments for atherosclerosis, other than the cost to the health care system. However, lifestyle changes and treatment can reduce the risk of atherosclerosis.

D The Effectiveness of Screening Programmes

Approximately a third of all breast cancer cases in the UK are diagnosed through screening programmes.

Between 1974 and 1988 approximately four million babies were screened for Down's syndrome. Only 10 cases were missed, indicating that this screening programme is very effective.

Cardiovascular disease is the main cause of death in the UK.

Screening for Down's syndrome successfully detects approximately 74% of pregnancies.

Assignment tip: If you are working towards a distinction in your assignment, evaluate three screening programmes and one vaccination programme, and evaluate how effective they are at reducing illness, for example, whether they have been taken up by a vast majority of the population, they have been successful at reducing infection and death rates. For the evaluation remember to write a balanced answer and discuss relevant advantages and disadvantages.

Screening Programmes Questions

- List the four types of screening programmes.
- Describe the screening programme for Down's syndrome.
- What is the advantage of having a screening test for breast cancer?
- Make a table outlining the advantages and disadvantages of each of the screening programmes explained in this information sheet.
- Further Your Learning Activity:** Working in pairs, use the Internet to research screening programmes and how effective they are at detecting disease. Discuss your findings with your partner and share ideas about how you could evaluate the effectiveness of the screening programmes you researched.

**COPYRIGHT
PROTECTED**



Screening Programmes Questions

1. List the four types of screening programme.

- 1 2
3 4

2. Describe the screening test for Down's syndrome.

.....

3. What is the advantage of having a screening test for breast cancer?

.....
.....

4. Make a poster outlining the advantages and disadvantages of each of the screening tests explained in this information sheet.

5. **Further Your Learning Activity:** Working in pairs, use the Internet to research screening programmes and how effective they are at detecting disease. Discuss your findings with your partner and share ideas about how you could evaluate the effectiveness of the screening you researched.

INSPECTION COPY



INSPECTION COPY

COPYRIGHT
PROTECTED



Assignment B: The Immune System, Vaccinations and Screening

Learner's name:		
Start date:	Deadline:	Day:

The Immune System, Vaccinations and Screening

Scenario

You are working as a GP at a local surgery and you are treating a patient who is returning from Africa in the near future. You have told the patient that she will need to be vaccinated against several diseases that are uncommon in the UK, but the patient is worried. She doesn't know why she needs the vaccinations and doesn't understand why she needs them.

Your next patient has recently become pregnant. Your patient wants to make sure she has the best health possible for her baby. She asks you for some information about relevant screening programmes that might become important in her life.

Task 1

For the patient who requires a vaccination, prepare a talk to give to her at the surgery. For the patient who is pregnant, prepare a leaflet about screening programmes to give to her.

For the talk:

Part 1 – Prepare a talk to give to the patient about the immune system:

1. Introduce the talk with a description of what the immune system is and how it protects the body from infection. Explain to the patient how the body's chemical and physical defences protect it from many infections.
2. Then go into more detail about the immune system by describing how the responses in the immune system defend the body against infection and the responses that happen inside the body and the specific cells involved.
3. Compare the different immune defences that you have already discussed with the patient how they are similar to each other and how they differ. Remember to discuss differences in terms of how the defences work.

Part 2 – The patient now feels much more informed about the immune system and how to protect herself. You decide to give her some specific advice about vaccinations.

4. Start by describing what a vaccine is and explain to the patient how it can help to reduce the likelihood of contracting a disease while she is travelling.
5. Explain to the patient what changes will happen in her body after she has a vaccine and how the immune system will give her extra protection against disease. Remember to explain what will happen to her cells.

Part 3 – You decide that in order to make an informed decision about having a vaccine, the patient should have all the facts about the success of vaccination programmes in the past.

6. Evaluate how effective vaccination programmes have been at reducing the risk of disease in the human population. Discuss with the patient whether vaccinations have reduced death rates. You could also discuss whether there have been any side effects in the past or refer to a case study.

INSPECTION COPY

COPYRIGHT
PROTECTED



For the leaflet

In part 1 of the leaflet you should introduce the screening programmes and in part 2 you should discuss the programmes more critically.

Part 1 – Introduce the screening programmes to give your patient all the information they need.

1. List three screening programmes that might be important for your patient in the future. Remember to tell your patient which diseases the programmes are for.
2. Describe how each of the programmes is carried out and explain to the patient how each programme will play in her current health, her future health and the health of her family.

Part 2 – As a health practitioner, it is your responsibility to give your patient information about the screening programmes.

3. Discuss the benefits of each of the three programmes your patient is considering and evaluate the potential drawbacks of the programmes.
4. Evaluate how effective the screening programmes have been at reducing rates of disease. Have the screening programmes been successful at reducing rates of disease? Discuss whether the programmes outweigh their disadvantages. Do you think that the programmes should be used? Why?

Remember to consider the effectiveness of all three screening programmes in your leaflet. You could also do some additional research into the programmes to see how often they have been consistent at detecting the diseases and whether they have improved health.



INSPECTION COPY

**COPYRIGHT
PROTECTED**

Learner's name:	Start Date:
Learner's declaration: I certify that the work submitted for this assignment is my own. I have clearly referred to sources of information and used appropriate referencing. I understand that false declaration is a form of malpractice.	
Learner's Signature:	Date:
Learner's comments for the assessor:	

Teacher's/assessor's name:	
Marking Criteria	
Task:	Criteria:
1	2B.M1 Describe how the immune system defends the body in relation to specific and non-specific immune responses.
	2B.P5 Describe the changes in the human body following vaccination.
	2B.M3 Compare the different defence mechanisms the immune system uses to protect the human body.
	2B.P6 Describe the role of specific health screening programmes.
	2B.M4 Discuss the advantages and disadvantages of a specific health screening programme.
	2B.D3 Evaluate the effectiveness of human vaccination and screening programmes.
Deadline:	
Summative feedback:	
Date assessed:	

Internal verifier's name:
Internal verifier's feedback:
Date:

If a learner has not met the Level 2 criteria they can be assessed on the Level 1 criteria	
1B.4	Identify the role of the immune system in defending the body.
1B.5	Identify how the body's defences aid in defending the body.
1B.6	Identify the role of specific health screening programmes.

**COPYRIGHT
PROTECTED**



Lesson Plan 7: Principles of Antibiotics

Learning Aims







All students should:	Describe how antibiotics are prescribed for use Investigate the use and misuse of antibiotics Identify pathogens that cannot be treated by antibiotics
-----------------------------	--

Key words: disease causes, pathogens, antibiotics, antibiotic resistance

Starter

Ask students to write down what they think a bacterium is.

Main

1. Go over the starter exercise.
2.  Introduce the concept of pathogens (microorganisms that cause disease) and explain that different pathogens require different treatments.
3.  Describe how we treat bacterial infections using antibiotics.
4. Group brainstorm on MRSA. Investigate how much the students already know about MRSA.
5.  Introduce the concept of antibiotic resistance.
6.  Explain the formation of MRSA in terms of antibiotic resistance.
7.  Practical: investigate the microorganisms that exist on different surfaces. Students should use sterile cotton swabs to collect samples from their work benches, door handles, etc. Students should then plate the samples on to agar nutrient gel and incubate until the next lesson (assuming that there are 2–3 days between lessons). Students should then compare the growth of microorganisms from the different surfaces and identify the type of microorganism that they expect to find on each surface.
Health and safety note: Ensure incubator temperatures do not exceed 37°C and do not open plates after incubation.
8.  Alternative practical: investigate the sensitivity of *E. coli* bacteria to different antibiotics. Students should divide an agar gel seeded with *E. coli* bacteria into sections. A different antibiotic/antifungal disc in each section. The *E. coli*-seeded agar should be prepared by students at the start of the lesson, which would allow them to incubate the discs. The antibiotic disc should then be incubated at 30°C. Students can measure the diameter of the inhibition zone using a ruler. Students can then compare their results using the information they will learn in the next lesson.
Health and safety note: Ensure incubator temperatures do not exceed 37°C and do not open plates after incubation.

Plenary

Ask students to write down the definitions of:

- pathogen
- bacteria
- antibiotic

INSPECTION COPY

COPYRIGHT
PROTECTED

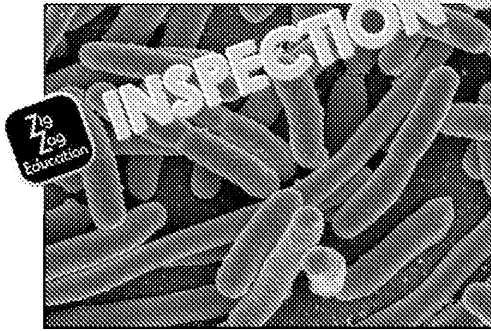


Investigating the Treatments Used when

Different diseases are caused by different types of **microorganism** (an organism that can only be seen with a microscope because it is so small).

For example the common cold and flu we suffer from in winter are both caused by viruses. A skin infection that affects the skin between the toes making it itchy, red and flaky is called athlete's foot. Meningitis, as its name suggests, is caused by a bacterium, as is tuberculosis. Measles, which involves the infection of the protective membranes that surround the brain, is caused by a virus.

Viral, fungal and bacterial infections require very different types of treatment.



E. coli bacteria

When we have a headache we might take a pain killing drug like paracetamol. Painkillers are known in the medical world as **analgesics**.

Microorganisms that make us ill are called pathogens. However, it is important to note that not all microorganisms are bad for our health; in fact, some of them are actually good for us. For example, there are bacteria that live inside our gut that help us to digest food.

Keywords

Bacteria – Small living cells that multiply rapidly. Some can make us ill if they produce chemical called toxins that poison our cells.

Virus – Very small infectious agents that reproduce inside the host's cells and when the host feel unwell.

Fungi – Spore-producing organisms made up of one (unicellular) or many cells.

Pathogen – A microorganism that causes disease.



**COPYRIGHT
PROTECTED**



Antibiotics

Antibiotics are drugs prescribed by doctors to treat infections caused by bacteria. They cannot be used to treat viral or fungal infections, or pain. These types of illness require different treatments that will be discussed later.

What are antibiotics used for?

Doctors have a wide range of different types of antibiotic at their disposal. Different types of bacteria often require treatment by different types of antibiotic. Diseases that might require antibiotic treatment include chest infections, urinary tract infections, meningitis and skin infections.

Did you know?

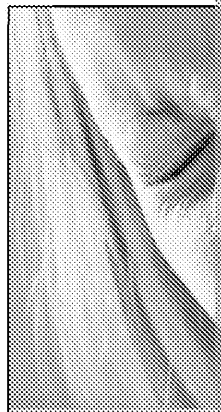
Before antibiotics could be done for and many people tuberculosis and penicillin.

Penicillin was the first antibiotic. It was discovered until the 1940s.

In the 1940s and 1950s, many more antibiotics were introduced in the twentieth century.

Misuse of Antibiotics

Unfortunately some doctors overprescribe antibiotics (use them to treat infections that aren't serious enough to require medication, or prescribe them for illnesses that might be caused by a virus rather than bacteria) and some patients do not complete their prescribed course because they start to feel better or because the antibiotic gives them side effects. Either of the above cases can result in **antibiotic resistance**.



WARNING: Colds and the flu can make you feel better, but they are not antibiotics.

A poster used in a classroom is not for educational purposes.

Antibiotic Resistance

Antibiotic resistance is when an antibiotic is no longer effective against the disease it was designed to treat. Antibiotic resistance arises because bacteria, through natural selection, evolve to become resistant to antibiotics. This means that the bacteria survive and carry on multiplying.

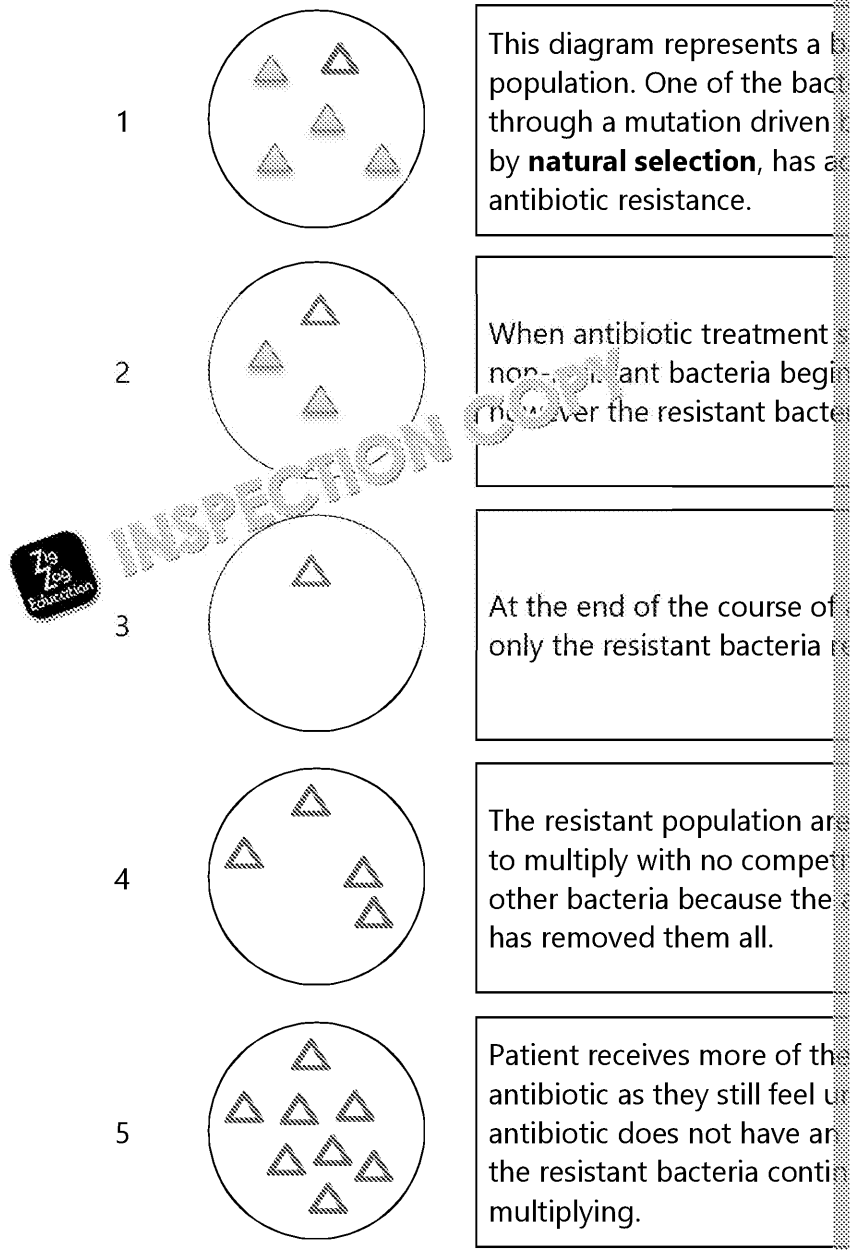
You should be able to see from your earlier studies that evolution by natural selection occurs. Those with characteristics most suited to their environment will survive and reproduce.

Here, the bacteria that will survive are those that have evolved a mutation and this allows them to become resistant to antibiotics.

COPYRIGHT
PROTECTED



Mechanism of Antibiotic Resistance



MRSA and Hospital-acquired Infections

Antibiotic resistance results in diseases like MRSA (methicillin-resistant *Staphylococcus aureus*) 'superbugs'. Superbugs are often subjects talked about in the news because they are difficult to treat. There are two main reasons why MRSA and other hospital-acquired infections are common. Firstly people in hospital are more vulnerable to infection because they tend to be older and have weaker immune systems than the general population. Secondly, the hospital environment patients are in is full of people including doctors and nurses going between patients. This provides the perfect environment for bacteria to spread.

A major factor that causes resistant bacteria to arise is the overuse of antibiotics. Bacteria that are resistant to many different types of antibiotic; it is therefore very difficult to treat. MRSA begins as a skin infection, but the infection becomes more serious if the bacteria reach the blood stream. This can lead to blood poisoning. The bacteria are spread easily and can also survive on surfaces such as door handles and floors for long periods of time. It is important that hospitals are kept clean and that staff and visitors maintain good hygiene. This can be done by screening for MRSA before a patient has an operation, washing hands between operations, wearing protective gloves when handling open wounds. Visitors to hospitals should wash their hands and use the antibacterial hand gels provided on wards.

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Lesson Plan 8: Principles of Antifungals, Antivirals

Learning Aims

All students should:	Identify pathogens that cannot be treated by antibiotics. Describe the use of anti-fungal, antiviral and analgesic drugs.
Most students should:	Analyse the effectiveness of different kinds of medical treatment in primary care using secondary data.
Some students should:	Evaluate the use of different kinds of medical treatment using secondary data and opinions.







Key words: disease causes, pathogens, fungi, viruses, pain, antifungals, antivirals, analgesics

Starter

Review the previous lesson on antibiotics. Write the gap-fill exercise below. Students should copy the text into their books and fill in the gaps.

Antibiotics are used to treat _____ infections. They work by killing the bacteria or _____ . They can be used to treat a wide _____ of infections. Unfortunately, _____ . Misuse of these drugs can lead to _____ in the bacteria.

Main

1. Go over the starter exercise. Gaps should be filled in the following order: **range, side effects, antibiotic resistance.**
2.  Ask students to look at the plates they prepared in the last lesson and the results they find. Discuss the findings as a class and dispose of the plates. See the lesson plan.
3.  Point out that some diseases cannot be treated with antibiotics.
4.  Describe how antifungals, antivirals and analgesics work.
5.  Discuss the advantages and disadvantages of each type of treatment.
6.  Discuss the principles of a treatment regime.
7.  Ask students to answer Questions 1-3 from the pack.
8. Go over the answers for Questions 1-8.
9. If there is time, ask students to start the 'further your learning' activity. This is homework using the information they gathered in the lesson.

Students might like to do their own research on MRSA and produce a poster explaining what it is, how it is spread and why it is such a problem in hospitals.

Plenary

Text it: ask students to write down three things they learned today in the form of a text message. Only 160 characters.

INSPECTION COPY

COPYRIGHT
PROTECTED



Advantages and Disadvantages of Medical Treatments

The table below summarises the principles and advantages and disadvantages of discussed in this unit.

Treatment	How it works	Advantages	Disadvantages
Antibiotics	Antibiotics work inside the body; they either kill bacteria or stop the bacteria from multiplying.	They do not harm patient's cells because bacteria exist outside cells and can be used to treat a wide range of bacterial infections.	Like most treatments they have adverse side effects. Allergic reactions can be threatening.
Antifungals	Either damage the cell wall or inhibit its growth, causing it to die or stop the fungus from reproducing.	Many different types are available in different forms, such as creams and tablets. Able to treat a wide range of fungal infections.	Side effects such as skin irritation and sickness. Some people are allergic.
Antivirals	Work inside the patient's cells to stop the virus from multiplying.	Reduce length of illness and reduce symptoms. They prevent a viral infection from becoming more serious.	Do not cure the disease and can damage the patient's cells as they work.
Analgesics	Stop pain signals from travelling to the brain.	Improve the quality of life of someone who is suffering with pain.	Long-term use can have serious side effects such as stomach bleeding. Some are addictive.

Treatment Regimes

A treatment regime is a plan designed to improve the health of a person. On a prescription, the patient receives instructions on how often to take their medicine, how they should take it and how long they should take it for.

Treatment regimes vary depending upon the patient, their illness and the medicine that has been prescribed. For example someone who has been diagnosed with a bacterial infection may be prescribed to take antibiotics for six months; however, someone who has been diagnosed with a viral infection would only need to take antibiotics for three days.

As we have seen, one of the important factors of any treatment of an infection is that the patient finishes their prescribed course, even if they feel better. This helps to prevent **antibiotic resistance** from building in the bacterial population.

D *Assignment tips: if you are working towards a distinction in your assignment, you should be able to justify the different types of medical treatment given for specific conditions, for example, treating bacterial or viral infections. You should also be able to justify treatment choices, for example, it would be counterproductive to give antibiotics to someone suffering from a viral infection and antibiotics treat bacterial infections.*

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Treatments for Disease Questions

1. Why do different diseases require different types of treatment?
2. What type of pathogens cannot be treated with antibiotics?
3. Match the illness with an appropriate treatment:

flu virus	antibiotics
bacterial meningitis	analgesics
athlete's foot	antivirals
headache	antifungals

4. Copy and complete the following sentences and fill in the gaps using the words in the box.

Zig Zag Education
resistance
MRSA
tuberculosis
multiplying
bacteria

Antibiotics are used to treat _____ infections such as _____ the bacteria from _____, or killing the bacteria. Like most medicines _____ . These can stop a patient from finishing their prescribed course of antibacterial _____ and the evolution of 'superbugs' such as _____

5. What are analgesics more commonly known as? How do they work?
6. Describe the two ways in which antifungals work.
7. What is a treatment regime?
8. Because a virus lives within the cell of the infected person, what is a disadvantage of using antivirals as a treatment? Why is this not a disadvantage when using antibiotics to treat bacterial infections?
9. **Further Your Learning Research Activity:** In small groups, use the Internet to find the names of some common antibiotics, antifungals, antivirals and analgesics and match them with some of the diseases they are used to treat.

a. Find some secondary data on the effectiveness of the medical treatment techniques you could use to analyse the data.

Tip: When looking for secondary data, try to find graphs that illustrate the rate of a particular disease. For example an antibiotic has reduced the rate of a particular disease.

b. Investigate the use and misuse of antibiotics and discuss how you could use this information to give guidance to doctors who prescribe antibiotics.

c. Discuss how you could evaluate the use of the medical treatment techniques. Consider the advantages and disadvantages of each treatment and consider how effective each treatment is for treating certain diseases.

Tip: Think about how much the drug has reduced the rates of the disease. Has the disease completely or has it only had a little effect?

**COPYRIGHT
PROTECTED**



Treatments for Disease Questions

1. Why do different diseases require different types of treatment?

.....

2. What type of pathogens cannot be treated with antibiotics?

.....

3. Match the illness with an appropriate treatment:



flu virus

bacterial meningitis

athlete's foot

headache

antibiotics

analgesics

antivirals

antifungals

4. Fill in the gaps using the words below.

resistance	MRSA	tuberculosis	multiplying	bo
------------	------	--------------	-------------	----

Antibiotics are used to treat _____ infections such as _____
 stopping the bacteria from _____, or killing the bacteria. Like
 _____. These can stop a patient from finishing their p
 resulting in antibacterial _____ and the evolution of 'sup

5. What are analgesics more commonly known as? How do they work?

.....

6. Describe the two ways in which antifungals work.

1
 2

7. What is a treatment regime?

.....

8. Because a virus lives within the cell of the infected person, what is a d
 treatment? Why is this not a disadvantage when using antibiotics to t

.....

**COPYRIGHT
 PROTECTED**



9. **Further Your Learning Research Activity:** In small groups, use the Internet to find the names of some common antibiotics, antifungals, antivirals and analgesics. Discuss some of the diseases they are used to treat.

- a. Find some secondary data on the effectiveness of the medical treatment techniques you could use to analyse these data.

Tip: When looking for secondary data, try to find graphs that illustrate how, for example an antibiotic, has reduced the rate of a particular disease.

- b. Investigate the use and misuse of antibiotics and discuss how you could give guidance to doctors who prescribe antibiotics.

- c. Discuss how you could reduce the use of the medical treatments. Consider the advantages and disadvantages of each treatment and consider how you could improve the treatment for treating certain diseases.

Tip: Think about how much the drug has reduced the rates of the disease. Has the disease completely or has it only had a little effect?



INSPECTION COPY

**COPYRIGHT
PROTECTED**



Lesson Plan 9: Principles and Uses of Blood Transfusions and Organ Donation

Learning Aims





All students should:	Identify the different blood groups. Explain the importance of blood group matching.
Most students should:	Describe organ donation and approaches to reduce rejection.

Key words: Blood groups, blood transfusions, organ donation, rejection

Starter

Write the words A, B, AB and O on the board. Ask students what they think

Main

1. Go over the starter exercise.
2.  Introduce the concept of blood groups. Ask students: 'does anyone know what blood groups are?'
3. Ask students if they know anyone who donates blood and if they would accept a blood transfusion.
4.  Describe what a blood transfusion is and why blood group matching is important. Introduce the terms 'donor' and 'recipient'.
5.  Describe what organ donation is and how the chances of rejection can be reduced.
6.  Ask students to answer Questions 1–6 from the pack.
7. Go over the answers to Questions 1–6.

Plenary

Ask students to write down three things they learned in today's lesson on a piece of paper and stick them on the board.

INSPECTION COPY

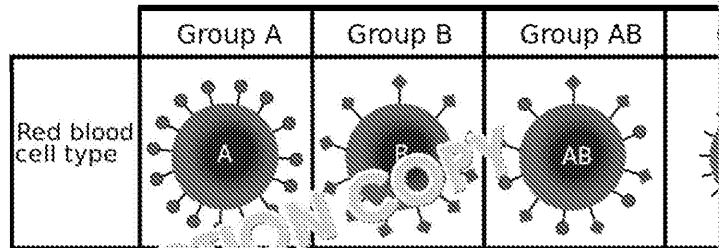
COPYRIGHT
PROTECTED



Blood Groups

There are four different types of blood; these are known as **blood groups**. We inherit our blood group from our parent's genes. The four groups are A, B, AB or O and each is either positive (+ve) or negative (-ve) for a protein called Rhesus factor (Rh).

Did you know?
With open importance



The four different blood groups

Blood Transfusions

Knowledge of blood groups is important when delivering **blood transfusions**. A blood transfusion is when the blood from one person (the **donor**) is transferred to another person (the **recipient**) during a medical procedure. A blood transfusion might be required if a person has had a serious injury that resulted in significant blood loss, or if they have a medical condition that affects their blood.

It is important that blood groups are matched between the donor and recipient to avoid rejection by the recipient's body. If blood groups were not matched, the body would mount an immune response against the donated blood. It would destroy the blood cells from the donor that it recognises as foreign. This is a very dangerous situation and can result in death.

Organ Donation

Organ donation involves a healthy person donating an organ to someone whose organ is failing to function correctly. Organ failure may be a result of disease or a result of poor lifestyle choices such as drinking too much alcohol. Organ donation is frequently a life-saving procedure. Many different organs of the body can be donated and transplanted including the **kidneys, liver, lungs and heart**.

As is the case with blood transfusions, it is important that organs for transplant are checked for compatibility between the donor and recipient. Both blood group tests and tissue type tests are carried out. This reduces the risk of the recipient's body rejecting the donor organ by mounting an immune response once it has been transplanted. The risk of rejection is further reduced by the use of anti-rejection drugs which weaken (suppress) the immune system.

Did you know?

- Blood transfusion was first performed in 1918 during the First World War.
- The first kidney transplant was performed in 1954.
- The first heart transplant was performed in the UK in 1983, but the patient died of infection.
- In 2005, the first liver transplant was successful.

**COPYRIGHT
PROTECTED**



Organ Donation and Blood Transfusions Questions

1. How do we inherit our blood group?
2. What are the four different blood groups?
3. What protein are blood groups tested positive or negative for?
4. What would happen if the donor's and recipient's blood groups are not the same for a transfusion?
5. Give an example of a reason for carrying out a blood transfusion.
6. Name four organs that can be donated.



INSPECTION COPY

INSPECTION COPY



INSPECTION COPY

**COPYRIGHT
PROTECTED**



Organ Donation and Blood Transfusions Questions

1. How do we inherit our blood group?
.....
2. What are the four different blood groups?
.....
3. What protein are blood groups tested positive or negative for?
.....
4. What would happen if the donor and recipient's blood groups are not a match?
.....
5. Give an example of a reason for carrying out a blood transfusion.
.....
.....
6. Name four organs that can be donated.
1 2
3 4

INSPECTION COPY

INSPECTION COPY

COPYRIGHT
PROTECTED



Lesson Plan 10: Medical Advances and the Principles of Stem Cell Therapy

Learning Aims








All students should:	Identify the different blood groups. Explain the importance of blood group matching.
Most students should:	Describe organ donation and approaches to reduce waiting times.
Some students should:	Evaluate the potential benefits of stem cell therapy.

Key words: genetic disease, gene therapy, stem cell research, ethics, embryo

Starter

Recap the previous lesson. 'Give me ten scientific words from our last lesson.'

Main

-  Explain what a genetic mutation is and introduce the concept of genetic diseases.
-  Remind students of the genetic diseases they studied in Unit 1 and the gene therapy used to help treat them.
-  Introduce stem cells.
-  Explain that under the right conditions, stem cells can be turned into specialised cells. Discuss with students how this could have an impact on the organ donations.
-  Discuss the ethical implications of stem cell therapy. Encourage students to express their own opinions on the treatment.
-  Go through the 'Medical Advances Question' in the pack as a class. Write down answers in their books afterwards.
-  Ask students to complete the 'further your learning' activities in the pack.

Plenary

Take five minutes to have a mini debate on stem cell research. Divide the class into two groups. One group should argue that stem cell research is good and should continue; the other half should argue that it is not good and should not continue.

INSPECTION COPY

**COPYRIGHT
PROTECTED**



Medical Advances

Life science is a fast moving scientific field – there have been a number of medical advances especially in the areas of gene therapy and stem cell research.

Gene Therapy

Gene therapy can be used to treat people with genetic disorders. One of the most common genetic disorders is cystic fibrosis. This is a disease of the cell membranes which is managed using physiotherapy and drugs.

Cystic fibrosis affects many organs, most notably the lungs and the pancreas. The pancreas is a gland causing them to produce thick mucus which, amongst other things, fills up the lungs. Other symptoms include difficulty breathing, chest infections, difficulty digesting food, diabetes, liver disease and infertility.

The effects of cystic fibrosis can be seen from birth, so new born babies are tested for the disease. Cystic fibrosis is caused by a recessive allele, meaning that to have the disease a person must have two copies of the affected allele. The allele can be passed down from one or both parents. Around 1 in 25 people in the UK have one copy of the affected allele.

Treatment

Cystic fibrosis could potentially be treated by removing the faulty gene from a few cells and replacing them with a functional one. Doing this would mean that all subsequent cells would also have a functional copy. These functional genes would be inherited by any future offspring. This is called germline gene therapy. However, this is currently illegal, as some people believe it could be the first step to creating designer babies.

Adults can be treated in a more basic way by adding functional genes to the faulty cells. This is called **somatic-cell gene therapy** and isn't heritable by offspring as it doesn't affect the germ cells. The faulty cystic fibrosis gene is isolated and inserted into a harmless virus (vector). The patient inhales the virus particles into their lungs. Once in the lungs the virus inserts its genetic material into the human cells, but instead it injects the functional gene into the patient's DNA. This functional gene then replaces the recessive faulty genes, restoring normal function. Research is only at an early stage as there are a number of issues with this treatment. The immune system will frequently kill off the viral particles and as lung cells are constantly dying and being replaced.

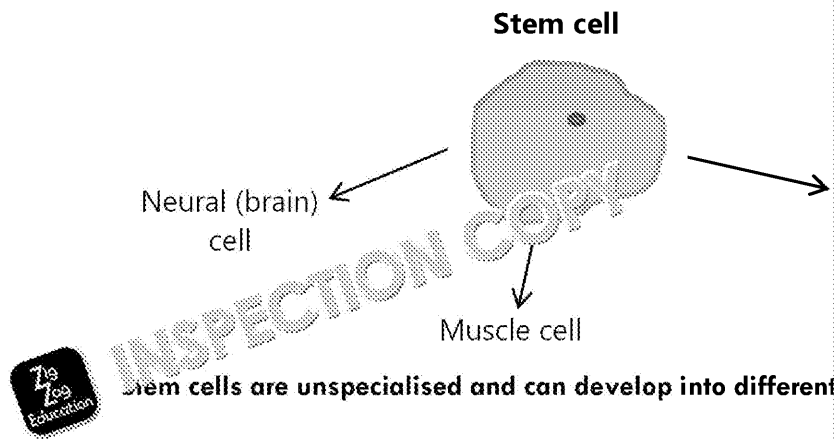
INSPECTION COPY

COPYRIGHT
PROTECTED



Stem Cell Therapy

Stem cells are **unspecialised cells** that scientists can grow into many specific cell conditions. Stem cells can be obtained from embryos (fertilised eggs in the first 6 days) or from adult tissues such as the bone marrow or muscle.



In 2010, the first windpipe grown from stem cells was successfully transplanted into a young girl with cancer. The organ was grown from stem cells from the girl's own bone marrow (the same as the cells in our bones). These were extracted and grown in the lab under special conditions. The scaffold was a windpipe that had been donated and stripped of its cells. The stem cells then grew into a complete organ.

Current Benefits

- Increasing our understanding of a number of diseases including cancer.
- Helping us to identify potential new drug targets.

D The Potential Benefits of Stem Cell Therapy and Ethical Issues

Future Potential

- Growing organs for transplant that would not be rejected.
- Curing neurodegenerative disorders (diseases that cause loss of brain cells) such as Alzheimer's disease.
- Treating heart disease and spinal cord injuries.

Ethical Issues

- Embryonic stem cells are derived from an inner cell mass, which raises ethical concerns.
- Many religions oppose the use of embryos because they believe that creating a potential human life is wrong.

Assignment tip: If you are working towards a distinction in your assignment, investigate the use of stem cell therapy, explain what it is and suggest ways that it can be used to treat disease and improve medical treatments such as organ transplant both now and in the future.

**COPYRIGHT
PROTECTED**



Medical Advances Questions

1. Decide whether the following statements are 'for' or 'against' the use of stem cell research. When you've decided, put them into a table with the headings 'for' and 'against'.

'In the future it may be possible to grow organs for transplant using stem cells from a donor.'

'Humans shouldn't play God.'

'An embryo is a form of life that is not capable of consenting to its use in research.'

'Stem cell research increases our understanding of important diseases such as cancer and a cure.'

2. **Further Your Learning Activity:** Using your own research and the information from this lesson, discuss the short- and long-term benefits of stem cell therapy for different groups. How effective do you think stem cell therapy will be at treating different medical treatments in the future? Consider the potential advantages and disadvantages of these treatments and how effective they might be at treating diseases.



Medical Advances Questions

1. Decide whether the following statements are 'for' or 'against' the use of stem cell research. When you've decided, put them into a table with the headings 'for' and 'against'.

'In the future it may be possible to grow organs for transplant using stem cells from a donor.'

'Humans shouldn't play God.'

'An embryo is a form of life that is not capable of consenting to its use in research.'

'Stem cell research increases our understanding of important diseases such as cancer and a cure.'

2. **Further Your Learning Activity:** Using your own research and the information from this lesson, discuss the short- and long-term benefits of stem cell therapy for different groups. How effective do you think stem cell therapy will be at treating different medical treatments in the future? Consider the potential advantages and disadvantages of these treatments and how effective they might be at treating diseases.

**COPYRIGHT
PROTECTED**



Assignment C: Principles and Uses of Treatments

Learner's name:		
Start date:	Deadline:	Da

Principles and Uses of Treatments for Infection

Scenario

You are a well-respected doctor and you have been asked to appear in a BBC documentary. The documentary will focus on the different treatments that people can have with

The local newspaper is very interested in your documentary and has asked to interview you about an organ transplant. In preparation for the interview, you have decided to plan some questions to discuss some of the interesting treatments available.

Task 1

First, write your script for the documentary (which you could film); this will be for the BBC. Next, write some notes in preparation for the interview.

For the documentary:

Episode 1

In the first episode, you should introduce the audience to the principles of antibiotics.

- 1a. Describe which type of infection you prescribe antibiotics for when a patient has it.
- 1b. Describe the guidance you give to your patients about completing a course of antibiotics.
- 1c. Explain to the audience why it is so important that a patient completes a course of antibiotics. What happens when they are used incorrectly. Support your explanation with graphs that show what happens when antibiotics are misused. You could use data from textbooks and/or on the Internet.

Episode 2

In the second episode you decide to discuss additional types of ailments and the common medical treatments.

2. Begin the episode by giving three types of ailment that you do not prescribe antibiotics for. Explain why you don't prescribe them for these ailments in terms of the pathogens that cause them.
3. Describe the treatments that you do use to treat these ailments. How do they work?
4. Conduct a comparison into antibiotics and the other treatments you discussed in episode 1. Provide data on the effectiveness of the treatments at treating the ailment and explain how the data demonstrates their effectiveness. You should also discuss the wider use of antibiotics in hospitals and the potential consequences on the rates of infection.
5. Conclude the episode by evaluating the use of the treatments you have discussed. Give your opinion and justify why the treatments are used. You could consider when they are used, the effects, how effective they are and how successful they have been.

INSPECTION COPY

COPYRIGHT
PROTECTED



For the interview:

First write down the responses you plan to make if you are asked the following

- What is an organ transplant and what is it used for?
- Why might a person have an organ transplant?
- What checks would be required before the transplant to reduce the likelihood of rejecting the donor organ?

Next write a set of notes that you plan to take with you to the interview so you can be prepared for discussing medical treatments with the interviewer. In your notes you should include:

1. State what the blood groups are and explain why blood group matching is important.
2. Explain how gene therapy can be used to treat genetic diseases. Think about how gene therapy could be used to treat and in what ways. Estimate how effective it could be. Use your own knowledge. Find some data that demonstrates the effectiveness of gene therapy. Analyse the data in your notes. What can the data and the knowledge you have from the BTEC course tell you about the potential benefits of gene therapy?
3. Explain how transplants of the future could be different due to stem cell technology. Compare the current benefits and the benefits the treatment could have in the future. How likely is gene therapy to be successful? Why? Remember to give a balanced answer, including potential benefits and any issues that might arise from the treatment.



INSPECTION COPY

**COPYRIGHT
PROTECTED**

Learner's name:	Start Date:
Learner's declaration: I certify that the work submitted for this assignment is my own. I have clearly referred to all sources of work. I understand that false declaration is a form of malpractice.	
Learner's Signature:	Date:
Learner's comments for the assessor:	

Teacher's/assessor's name:	
Marking Criteria	
Task:	Criteria Learner must:
1	2C.P1 Investigate the use and misuse of antibiotics using secondary data.
	2C.P8 Describe the use of antifungal, antiviral and analgesic treatment.
	2C.D4 Evaluate the use of different kinds of medical treatments, justify your opinions.
	2C.P9 Explain the importance of blood group matching in blood transfusions.
	2C.M5 Analyse the effectiveness of different kinds of medical treatments in healthcare using secondary data.
	2C.M6 Describe organ donation and approaches to reduce rejection.
2C.D5 Evaluate the potential benefits of stem cell therapy.	
Deadline:	
Summative feedback:	
Date assessed:	

Internal verifier's name:
Internal verifier's feedback:
Date:

If a learner has not met the following criteria, they can be assessed on the Level	
1C.7	Describe how antibiotics are prescribed for use.
1C.8	Identify pathogens that cannot be treated by antibiotics.
1C.9	Identify the different blood groups.

COPYRIGHT PROTECTED



Answers to Questions

Lesson Plan 1: Balanced Diet Questions

1. Carbohydrates, proteins, fats, vitamins and minerals.
2. because he/she is using their muscles more and these require energy to work
3. Because they are growing and are probably more active than someone who
4. Obesity is a disease caused by **overeating**. Obesity increases the risk of suffering. On the other hand, undereating can lead to **malnourishment**. Therefore it is
5. Overeating can cause obesity leading to diseases such as type 2 diabetes . Under and malnourishment.
6. Psychological therapy and advice on eating and nutrition.
7. Students' own answers.

Lesson Plan 2: Exercise Questions

1. Reduced stress and improved mental wellbeing, improved cardiovascular health, physical mobility.
2. Can aid in weight loss. Burns off extra energy consumed in food.
3. Moderate intensity exercise raises heart rate a little and causes the person to breathe whereas vigorous intensity exercise means that the heart rate is considerably higher. Exercising is breathing hard and fast.
4. The recommended guideline for the amount of exercise for a teenager is 60 minutes per day should be a combination of moderate and vigorous intensity.

Lesson Plan 3: Data Analysis Questions

1. Childhood obesity cases have risen between 1995 and 2005.
2. This trend in data exists possibly because children are eating an unhealthy, unbalanced diet as a result of physical inactivity.
3. Risk of him developing lung cancer.
4. Advise him to cut down on the number of cigarettes or quit smoking completely.

Lesson Plan 3: Data Analysis and Evaluation Questions

1. The number of people over the age of 16 that smoke has decreased.
2. Might be a result of an increased awareness of the risks of smoking, aided by the introduction of a smoking ban.
3. The percentage of children that eat their recommended five-a-day has increased.
4. Students should write a balanced paragraph that includes the following points. It seems that raised awareness of the dangers of smoking has led to a reduction in the number of people who smoke. This suggests that government anti-smoking measures have been a success. It seems to be working, judging by the increase in the percentage of children that eat their recommended five-a-day. However, evidence also suggests that child obesity is on the rise. Therefore more measures have not been completely successful. More should be done to educate children with a balanced diet.

INSPECTION COPY

COPYRIGHT
PROTECTED



Lesson Plan 4: Immune System Questions

1. The immune system is the body's natural defence mechanism against disease, preventing the body from falling ill, either by stopping pathogens from entering the body, or killing them once they are inside.
2. The skin or a scab.
3. Phagocytosis is the process by which pathogens are engulfed and digested by white blood cells.
4. Specific immune response involves the production of antibodies which are secreted by some types of white blood cell.
- 5.

Immune response	Acts inside/outside body	Specific/non-specific
Physical barrier	Outside	Non-specific
Chemical defence	Inside	Non-specific
Inflammation	Inside	Non-specific
Phagocytosis	Inside	Non-specific
Specific immune response	Inside	Specific

Lesson Plan 5: Vaccination Questions

1. Vaccines contain bacteria/viruses in a dead, weakened or inactive form.
2. White blood cells recognise pathogens contained in vaccine, and begin producing antibodies. The pathogen is then attacked and destroyed by the immune system.
3. Advantages: saves lives and prevents the spread of a pathogen through a population. Disadvantages: some people have adverse reactions to the vaccination and the effectiveness of vaccines against viruses with high mutation rates.
4. From 1998 onwards, the percentage of the population that had received the MMR vaccine fell to 80% by 2005. This drop in the percentage was probably a result of the scare associated with a study published in 1998. When this theory was later disproved the percentage of the population that received the vaccine began to rise again.
5. The number of measles cases increased dramatically, probably as a result of fewer people receiving vaccinations as described in question 4, which was a consequence of the vaccine scare.

Lesson Plan 6: Screening Programmes Questions

1. Cancer screening, antenatal screening, newborn screening, vascular screening.
2. An ultrasound scan and a blood test.
3. It can diagnose breast cancer in the very early stages before symptoms become apparent, so it can be more successfully treated.
- 4.

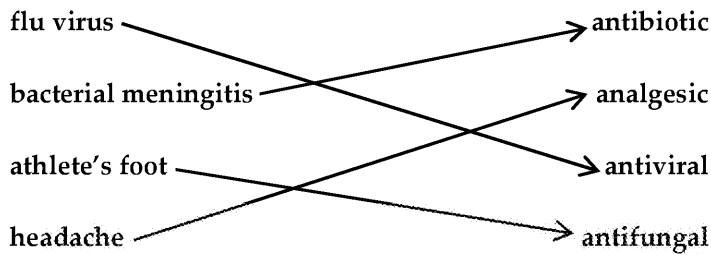
Screening programme	Advantage	Disadvantage
Breast cancer	Provides early detection of cancer, therefore treatment is more likely to be successful.	Some women may find mammograms uncomfortable. Involves X-rays.
Prostate cancer	Early detection of cancer.	May cause false positives.
Antenatal	Women can be offered specialist counselling and support before the birth.	Tests are expensive.
Antenatal	Child can be put on a special diet before any damage is caused.	Can lead to false positives.
Vascular	Prevents development of cardiovascular disease. Prevention is cheaper than treatment.	Expensive.

**COPYRIGHT
PROTECTED**



Lesson Plan 8: Treatments for Disease Questions

1. Because they are caused by different types of microorganism.
2. Fungi and viruses.
- 3.



4. Antibiotics are used to treat **bacterial** infections such as **tuberculosis** (a high respiratory system). They work by stopping the bacteria from **multiplying**, so medications they have **side effects** these can stop a patient from finishing the antibiotics resulting in a bacterial **resistance** and the evolution of 'superbugs'.
5. Analgesics are commonly known as painkillers. They work by stopping the brain from sending pain signals.
6. Antifungals work either by killing the fungal cell by damaging its cell wall or by stopping it from growing.
7. A plan that tells patients how long to take their medication for and how much to take to cure their illness.
8. A disadvantage of using antiviral treatment is that it damages the cells of the host, whereas with antibiotics because bacteria live outside of the host's cells.

Lesson Plan 9: Organ Donation and Blood Transfusions Questions

1. We inherit our blood group from our parents.
2. The four different blood groups are A, B, AB and O.
3. The protein Rhesus factor (Rh).
4. The blood would be rejected by the recipient's body.
5. A serious injury that resulted in significant blood loss or a medical condition that requires a transplant.
6. Organs that can be donated include heart, kidneys, liver and lungs.

Lesson Plan 10: Medical Advances Questions

1.

For	Against
In the future it may be possible to grow organs for transplant, eliminating the need for an organ donor.	Humans shouldn't play with genetic engineering.
Stem cell research increases our understanding of important diseases such as cancer and may help us find a cure.	An embryo is a form of human life and shouldn't be used for anything other than its use in research.

**COPYRIGHT
PROTECTED**

