

This programme is initiated and funded by Pfizer.

Introduction to the KS3 programme

The World Health Organisation acknowledges that the number of high-threat infectious hazards are on the rise,¹ and that many of these are spreading faster than ever in different regions of the world.² The combination of newly discovered diseases, and the re-emergence of many long-established ones, demands all countries work together and respond appropriately to the potentially fatal threat of infections.²

Infectious diseases all have the potential to impact human beings and the way we live our lives. There are, however, strategies that can be employed by everyone to try and reduce the spread of infections in order to reduce the likelihood of epidemics/pandemics. It is essential therefore that young people are given more guidance around disease prevention, so with this in mind Pfizer has designed an education module to teach KS2 and KS3 children more about viruses and pandemics.

In Pfizer's **Viruses and Pandemics Module**, young people will investigate the tiny world of micro-organisms, discovering the science behind these small things and the people who study them. Through interesting and engaging activities, learners will become confident in understanding viruses and how they cause disease, as well as exploring the different ways infections can be spread and prevented.

The main purpose of this resource is to ensure all young people are clear about their role in preventing the spread of infection in order to prevent a pandemic.

The resources will be part of an online eLearning module which will culminate with a quiz and activities for young people to complete in order to test their learning.

Navigating Pfizer's Viruses and Pandemics Module

The **Viruses and Pandemics Module** is an eLearning resource which can be used at home or within a group learning session. The programme is an online eLearning resource intended for young people aged between 11-14 (KS3).

Available Resources within the eLearning module:

- KS3 Viruses and Pandemics Module Delivery Notes
- KS3 Viruses and Pandemics Module Presentation and Quiz
- KS3 Transmission Activity Sheet
- KS3 Health Emergency Activity Sheet

Facilitators can use the **Viruses and Pandemics Module** Delivery Notes to guide learners through the eLearning **Viruses and Pandemics Module** Presentation. The content consists of learning objectives and outcomes, a starter, four core activities and a plenary (task to check the learning that has taken place).

Subsequently, learners can undertake a quiz to see what they have learnt from the session. Young people also have the option to complete Activity Sheets from the **Viruses and Pandemics Module** to deepen their learning and understanding. The purpose of these activities sheets is not to produce one single answer, they are however to promote further thinking and to aid extended learning around the topic of viruses and pandemics.

- <https://www.who.int/activities/preventing-epidemics-and-pandemics> Accessed May 2020
- <https://www.who.int/emergencies/diseases/managing-epidemics-interactive.pdf> Accessed May 2020

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The **Viruses and Pandemics Module** has been designed to link to the national curriculum across all four nations in the United Kingdom. The key terminology, content and activities have been created with the intended key stage in mind, so that adequate progress and learning can take place throughout the module.

Pfizer's Viruses and Pandemics Module learning guide

Learning objective:

Young people will be learning about how small things can cause humans to be unwell. Learners will explore the impact that these micro-organisms, specifically viruses, can have on the world, and what people can do to keep each other safe.

Learning outcomes:

- I can **identify** the different types of micro-organism.
- I can **recall** the structure of a virus.
- I can **explain** how a virus can make us feel unwell.
- I can **describe** the ways people can prevent spreading infections.
- I can **compare** the difference between an epidemic and a pandemic.

Introduce the session

Young people will be exploring the health impacts of micro-organisms on human beings and communities all over the world. Before beginning, it is important to highlight that this is a challenging topic with real life implications on a global scale, therefore it is important to respect the content within the presentation and ensure that all learners feel comfortable with covering the content within this module. It would be advised that a safe learning environment is created prior starting the session, establishing ground rules that will enable fair discussion and sharing of facts and opinions. Some examples of ground rules could be:

'I will respect the ideas and opinions of other people.'

'I will not interrupt someone when they are sharing an opinion.'

'I will not force anyone to speak if they do not wish to.'

Timings

This module has no specific timings as can be completed online at the pace of the learner. Extension tasks within each core activity have been provided if the learner, or facilitator, wish to spend more time exploring the topic.

Starter

Task:

- Explore slides **1-3** of the **KS3 Viruses and Pandemics Module** Presentation.
- Introduce the outcomes of the session, explaining that these will be revisited at the end.
- Explore the information on viruses from the Presentation and ask learners to answer the following five questions.

1. What is a micro-organism?
2. What are the four main groups of pathogen?
2. What are the names of the different parts of a virus?
3. What are some examples of viral diseases?
4. Why do viruses make a person feel unwell?
5. What is the meaning of the word pathogen?

Instructional Notes: Answers can be written down on paper or discussed verbally.



Core Activity 1

Task:

- Explore slides 4-6 of the **KS3 Viruses and Pandemics Module** Presentation.
- Discuss the meaning of 'infectious' and whether the following diseases are infectious or not: Influenza (Y), Heart Disease (N), Chickenpox (Y), Alzheimer's disease (N), HIV (Y), Diabetes (N), Cancer (N), Measles (Y).³
- Introduce young people to the different ways our bodies try and stop pathogens entering our bloodstream.
- Ask learners to create a 'high five' diagram to show what they can remember from memory.
- Share as a group.

Instructional Notes: To create a 'high five' diagram, ask learners to draw around one of their hands. In the hand they must try and write 5 ways in which the body protects us from harmful pathogens.

Young people may need reminding of the different parts of the bloodstream if they are unsure of this. (Blood is made from red and white blood cells, plasma and platelets⁴).

Support: Learners can complete the 'high five' individually in silence or can work with other people with information on the screen if they require help.

Extension – for additional challenge pupils could discuss/research the different types of white blood cell, as there are two heavily involved in the immune response, phagocytes and lymphocytes.⁵

Core Activity 2

Task:

- Explore slides 7-8 of the **KS3 Viruses and Pandemics Module** Presentation.
- Ask young people the meaning of transmission.
- Ask learners to match up each transmission method to a description.
- Inform young people that reducing the spread of infectious diseases, specifically viral transmission, is very important to human health.
- Introduce the different ways that people can reduce the spread of disease.
- Ask learners to try and think of some more ways to reduce viral transmission.

Instructional Notes: It is important to highlight that droplet and airborne transmission are different. Droplet transmission is where a pathogen travels inside the liquid/mucus of a cough or sneeze, usually only being transported short distances, whilst airborne pathogens float in the air and can travel larger distances.⁶

Support: There might be additional content that learners are introduced to at this point, such as sexually transmitted diseases and vaccines,⁷ for more support on this please visit: <https://www.nhs.uk/conditions/sexually-transmitted-infections-stis/> and <https://www.nhs.uk/conditions/vaccinations/>.

Extension – for additional challenge ask learners to find out more about how vaccines work and the different types available to young people.

Core Activity 3

Task:

- Explore slides 9-10 of the **KS3 Viruses and Pandemics Module** Presentation.
- Discuss the meaning of pandemic and epidemic. Ask young people to write down their definition.
- Show learners the definition of both words as described by the World Health Organisation and ask learners to review and edit their definitions if necessary.
- Introduce young people to key scientists involved in preventing an emergency health situation, (some of which may have already been discussed in the previous activity).
- Ask learners if they can think of any other careers that would be useful during a pandemic. Then to choose one of these jobs and explore the skills they think you would need to do this role.

3. https://www.who.int/topics/infectious_diseases/en/ Accessed May 2020

4. <https://www.blood.co.uk/why-give-blood/how-blood-is-used/blood-components/> Accessed May 2020

5. <https://www.ncbi.nlm.nih.gov/pubmed/18241683> Accessed May 2020

6. https://www.who.int/diseasecontrol_emergencies/publications/idhe_2009_london_inf_dis_transmission.pdf Accessed May 2020

7. https://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/ Accessed May 2020

Activity Sheets:

Transmission Activity Sheet.

Instructional Notes: The table is two simple columns, one with a title: 'What can the general public do' and the other, 'What can professionals do?', (such as the Government, Scientists, Pharmaceutical companies, etc).

Support: If young people require additional support with the activity, direct learners to information from the first page of this WHO health law document¹⁰ and/or look at p4 of the PHE infectious disease strategy.¹¹

Health Emergency Activity Sheet.

Instructional Notes: [REDACTED]

[REDACTED]

[REDACTED]

Support: [REDACTED]

[REDACTED]

Optional Activities for further learning:

- [REDACTED] what was the impact?
- [REDACTED] infectious diseases.
- Write a letter to a local MP outlining how schools and homes could be better equipped to help reduce the spread of infectious diseases.
- Read through [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/430422/preparedness-\(pip\)-framework.pdf?sfvrsn=5897327e_2](#) [REDACTED] potential threat of pandemics.

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Science (Biology) Curriculum Links

England¹¹

- Learners are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.
- Learners must be exposed to examples that serve a variety of purposes, from showing how scientific ideas have developed historically to reflecting modern developments in science.
- Learners should know the structural adaptations of some unicellular organisms.

Scotland¹²

- Learners explore the risk and impact of micro-organisms in relation to health. (Biological Systems).
- Learners know the symptoms of some common diseases caused by germs. I can explain how they are spread and discuss how some methods of preventing and treating disease benefit society (SCN 1-13a).
- Learners can describe how skin, as an organ, provides a barrier to infection (SCN 1-12a).
- Learners can discuss how people use science in their everyday lives and can describe a variety of jobs and careers which require scientific knowledge and skills (SCN 1-20a).
- Learners have an appreciation of the contribution that individuals are making to scientific discoveries and inventions and the impact this has made on society (SCN 2-20a).

Wales¹³

- Learners use and develop their skills, knowledge and understanding by investigating how humans are independent yet rely on other organisms for survival, applying this to life in countries with different levels of economic development.
- Learners understand applications of science, medicine and technology that are used to improve health and the quality of life.
- Learners find out about the way in which science contributes to careers and the world of work, by studying a range of applications of science, medicine and technology in their everyday life and in the wider world. This gives learners insight into how scientists work and also develops experimental and generic skills needed for the world of work.

Northern Ireland¹⁴

- Identify how skills developed through science will be useful to a wide range of careers, for example, jobs involving animal welfare, building and construction, education, electrical work, engineering, environmental management, financial services, food and farming, forensics, information and communications technology, journalism, plumbing, technology, pharmaceuticals, medicine etc.
- Cultural understanding to consider how the development of scientific ideas or theories relate to the historical or cultural context.
- Explore physical, chemical and biological effects on personal health.

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11. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335174/SECONDARY_national_curriculum_-_Science_220714.pdf Accessed May 2020
12. <https://education.gov.scot/Documents/sciences-eo.pdf> Accessed May 2020
13. <https://hwb.gov.wales/storage/779c7300-574d-4a12-a518-c873557d6a7a/science-in-the-national-curriculum.pdf> Accessed May 2020
14. <https://ccea.org.uk/downloads/docs/ccea-asset/General/Statutory%20Requirements%20for%20Science%20at%20Key%20Stage%203.pdf> Accessed May 2020

Glossary^{15,16}

AIDS: A disease in which there is a severe loss of the body's cellular immunity, greatly lowering the resistance to infection and malignancy.

Alzheimer's: Progressive mental deterioration that can occur in middle or old age, due to generalised degeneration of the brain.

Antibiotics: A medicine (such as penicillin or its derivatives) that inhibits the growth of or destroys microorganisms.

Antivirals: (chiefly of a drug or treatment) effective against viruses.

Bacteria: A member of a large group of unicellular micro-organisms which have cell walls but lack organelles and an organised nucleus, including some that can cause disease.

Biotechnology company: The exploitation of biological processes for industrial and other purposes, especially the genetic manipulation of micro-organisms to produce antibiotics, hormones, etc.

Blood: The red liquid that circulates in the arteries and veins of humans and other vertebrate animals, carrying oxygen to and carbon dioxide from the tissues of the body.

Cancer: A disease caused by an uncontrolled division of abnormal cells in a part of the body.

Cell: The smallest structural and functional unit of an organism, which is typically microscopic and consists of cytoplasm and a nucleus enclosed in a membrane.

Chemical barrier: An obstacle that prevents movement or access involving a distinct compound or substance, especially one which has been artificially prepared or purified.

Childbirth: The process of giving birth to a child.

Compare: Estimate, measure, or note the similarity or dissimilarity between.

Consume: Eat, drink, or ingest (food or drink).

Describe: Give a detailed account in words.

Defence: The action of defending from or resisting attack.

Destroy: End the existence of (something) by damaging or attacking it.

Diabetes: A disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrates and elevated levels of glucose in the blood.

Disease: A disorder of structure or function in a human, animal, or plant, especially one that produces specific symptoms or that affects a specific location and is not simply a direct result of physical injury.

DNA: Deoxyribonucleic acid, a self-replicating material which is present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.

Enzyme: A substance produced by a living organism which acts as a catalyst to bring about a specific biochemical reaction.

Epidemic: Is when an unusually high number of people in one place all have the same infection.

Explain: Make (an idea or situation) clear to someone by describing it in more detail or revealing relevant facts.

Evaluate: Form an idea of the amount, number, or value of something.

Fungi: Any of a group of spore-producing organisms feeding on organic matter, including moulds, yeast, mushrooms, and toadstools.

Global: Relating to the whole world; worldwide.

Health: The state of being free from illness or injury.

Heart Disease: Disease which affects the heart.

Herd Immunity: The resistance to the spread of a contagious disease within a population that results if a sufficiently high proportion of individuals are immune to the disease, especially through vaccination.

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15. https://www.lexico.com/?search_filter=dictionary Accessed May 2020

16. <https://www.who.int/hac/about/definitions/en/> Accessed May 2020

Glossary Continued^{15,17}

Host: An animal or plant on or in which a parasite or commensal organism lives.

HIV: Human immunodeficiency virus, a retrovirus which causes AIDS.

Hydrochloric acid: A strongly acidic solution of the gas hydrogen chloride in water.

Identify: Establish or indicate who or what (someone or something) is.

Immune System: The organs and processes of the body that provide resistance to infection and toxins. Organs include the thymus, bone marrow, and lymph nodes.

Immunologist: A scientist involved in the branch of medicine and biology concerned with immunity.

Infected: (of a person, organism, etc.) affected with a disease-causing organism.

Infectious: (diseases) are caused when certain micro-organisms, such as viruses, enter the body and cause problems. Some, but not all, infectious diseases can be spread from person to person.

Influenza: A highly contagious viral infection of the respiratory passages causing fever, severe aching, and catarrh, and often occurring in epidemics.

Lymphocyte: A form of small leucocyte (white blood cell) with a single round nucleus, occurring especially in the lymphatic system.

Medicine: A drug or other preparation for the treatment or prevention of disease.

Micro-organisms: A microscopic organism, especially a bacterium, virus, or fungus.

Mucus: A slimy substance, secreted by the mucous membranes and glands of animals for lubrication, protection, etc.

Mutation: The changing of the structure of a gene, resulting in a variant form that may be transmitted to subsequent generations, caused by the alteration of single base units in DNA, or the deletion, insertion, or rearrangement of larger sections of genes or chromosomes.

NHS: National Health Service is (in the UK) a system of national medical care paid for mainly by taxation and started by the Labour government in 1948.

Pandemic: refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

Pathogen: A bacterium, virus, or other micro-organism that can cause disease.

Phagocytes: A type of cell within the body capable of engulfing and absorbing bacteria and other small cells and particles.

Pharmaceutical company: Organisation that relates to medicinal drugs, or their preparation, use, or sale.

Pharmacologist: A scientist who is involved with the branch of medicine concerned with the uses, effects, and modes of action of drugs.

Physical barrier: An obstacle that prevents movement or access relating to the body.

Plasma: The colourless fluid part of blood, lymph, or milk, in which corpuscles or fat globules are suspended.

Platelets: A small colourless disc-shaped cell fragment without a nucleus, found in large numbers in blood and involved in clotting.

Protein: Any of a class of nitrogenous organic compounds which have large molecules composed of one or more long chains of amino acids and are an essential part of all living organisms, especially as structural components of body tissues such as muscle, hair, etc., and as enzymes.

Protist: A single-celled organism of the kingdom Protista, such as a protozoan or simple alga.

Re-emergence: The process of coming into sight or prominence once more.

Red Blood Cells: Contain the pigment haemoglobin, which imparts the red colour to blood, and transport oxygen and carbon dioxide to and from the tissues.

Reproduce: (of an organism) produce offspring by a sexual or asexual process.

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15. https://www.lexico.com/?search_filter=dictionary Accessed May 2020

17. <https://www.cdc.gov/csels/dsepd/ss1978/lesson1/section11.html> Accessed May 2020

Glossary Continued¹⁵

Research Scientist: A scientist involved in the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.

Sexual Intercourse: Sexual contact between individuals involving penetration, especially the insertion of a man's erect penis into a woman's vagina.

Trachea: A large membranous tube reinforced by rings of cartilage, extending from the larynx to the bronchial tubes and conveying air to and from the lungs; the windpipe.

Transmission: The action or process of transmitting something or the state of being transmitted.

Vaccines: Treatment with a vaccine to produce immunity against a disease; inoculation.

Virus: An infective agent that typically consists of a nucleic acid molecule in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host.

Virologist: A scientist who works in the branch of science that deals with the study of viruses.

White Blood Cell: A colourless cell which circulates in the blood and body fluids and is involved in counteracting foreign substances and disease.

WHO (World Health Organisation): An agency of the United Nations, established in 1948 to promote health and control of communicable diseases. It assists in the efforts of member governments, and pursues biomedical research through some 500 collaborating research centres throughout the world. Its headquarters are in Geneva.

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15. https://www.lexico.com/?search_filter=dictionary Accessed May2020