



Micro-organisms: Introduction to Microbes

Students are introduced to the exciting world of microbes. In this lesson they will learn about bacteria, viruses and fungi, their different shapes and the fact that they are found everywhere.

Curriculum Links

Science

- Scientific thinking
- Analysis and evaluation
- Experimental skills and strategies

Biology

- Cells
- Development of medicines
- Health and disease

PSHE/RSHE

- Health and prevention

English

- Reading
- Writing

Art & design

- Graphic communication

Key Words

Bacteria, Cell, Fungi, Microbe,
Microscope, Pathogen, Virus

Learning Outcomes

All students will:

- Understand that useful bacteria are found in our body.
- Understand that microbes come in different sizes.
- Understand the key differences between the three main types of microbe.

Most students will:

- Understand using a variety of scientific concepts and models, how to develop scientific explanations.

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[e-bug.eu/eng/KS4/lesson/
Introduction-to-Microbes](http://e-bug.eu/eng/KS4/lesson/Introduction-to-Microbes)

Resources Required

Introduction

Per student

- Copy of SH1

Main Activity: Microbe Mayhem

Per group

- Copy of SH2
- Copy of SH3
- Copy of SH4
- Copy of SH5

Extension Activity: Posters

- Pens/pencils
- Paper

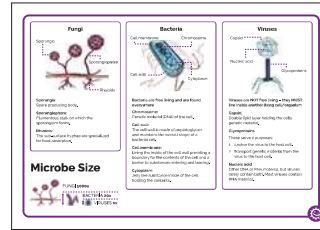
Alternative Main Activity: Peer Education

- Groups of 3 or 4 students

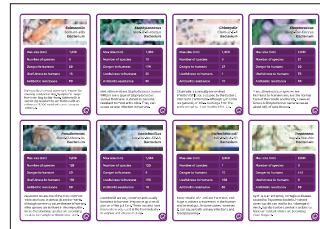
Advance Preparation

Cut out and laminate a set of playing cards (SH2 – SH5) for each group.

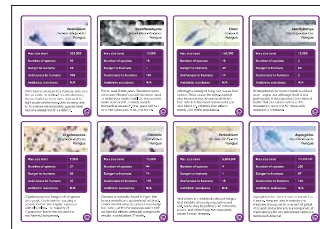
Supporting Materials



SH1 How big is a microbe?



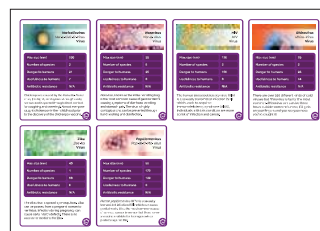
SH2 Microbe Mayhem Sheet 1



SH3 Microbe Mayhem Sheet 2



SH4 Microbe Mayhem Sheet 3



SH5 Microbe Mayhem Sheet 4

Lesson Plan



≡ Introduction

1. Begin the lesson by asking students what they already know about microbes. Most students will already know that microbes can cause illness but may not know that microbes can also be good for us. Ask the class where they would look if they wanted to find microbes. Do they think microbes are important to us?
2. Explain that microbes are the smallest living creatures on Earth and that the word micro-organism literally translates into micro: small and organism: life. Microbes are so small they cannot be seen without the use of a microscope. Antonie van Leeuwenhoek created the first microscope in 1676. He used it to examine various items around his home and termed the living creatures (bacteria) he found on scrapings from his teeth 'animalcules'.
3. Show the class that there are three different types of microbe: bacteria, viruses and fungi. Use SH1 to demonstrate how these three microbes vary in shape and structure.
4. Highlight to the class that microbes can be found EVERYWHERE – floating around in the air we breathe, on the food we eat, in the water we drink and on the surface of and in our bodies. Emphasise that although there are harmful microbes that can make us ill, there are many more useful microbes that we can use.
5. Emphasise that although microbes cause disease, there are also useful microbes. Ask students to identify some benefits of useful microbes. If they cannot, provide examples for them e.g. *Lactobacillus* in yoghurt, probiotic bacteria in our gut which aid digestion and the fungus *Penicillium* which produces the antibiotic Penicillin.

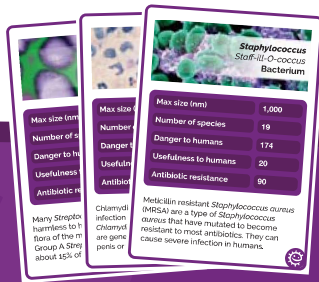
Main Activity: Microbe Mayhem

1 Shuffle the cards and deal cards to players

2 Make sure only you can see your cards

3 Take turns to choose which microbe characteristic you would like to battle others with

4 The player with the highest characteristic score wins the round!



Max size (nm)	1,000
Number of species	19
Danger to humans	174
Usefulness to humans	20
Antibiotic resistance	90

Max size (nm)	101,000,000
Number of species	200
Danger to humans	47
Usefulness to humans	124
Antibiotic resistance	N/A

Microbe Mayhem

In this activity groups of 3 – 4 students play a card game which helps them remember some of the technical words relating to microbes as well as familiarising students with a variety of microbial names, the differences in size, capability of causing harm and if antibiotic resistance occurs. Microbe size and number of species are correct at the time of resource development; however, as new microbes are continuously being discovered and reclassified, these numbers may be subject to change. The numbers in the other headings used on the cards are only to be used as a guide and are illustrative only. They are not accurate as there is no formulae to create these and they may be subject to change i.e. bacterial species may develop resistance to more antibiotics resulting in them having a higher number in this column and being more dangerous to humans.

Hand out a set of Microbe Mayhem playing cards (SH2 - SH5) to each group and ask each group to appoint a dealer. Let the students know that 'nm' on the playing cards stands for nanometres. There are ten million nanometres in a centimetre.

Game rules

1. The dealer should shuffle the cards well and deal all the cards face down to each player. Each player holds their cards face up so that they can see the top card only.
2. The player to the dealer's left starts by reading out the name of the microbe on the top card and chooses an item to read (e.g. Size 50). In a clockwise direction, the other players then read out the same item. The player with the highest value wins, taking the other players top cards and placing them to the bottom of their pile. The winner then reads out the name of the microbe on their next card and selects the item to compare.

3. If 2 or more players have the same top value then all the cards are placed in the middle and the same player chooses again from the next card. The winner then takes the cards in the middle as well. The person with all the cards at the end is the winner.

Alternative Main Activity: Peer education

Divide the class into groups of 3 – 4 students. Explain to the students that they will be creating a presentation to teach a group of their younger peers about microbes. Allow the students to choose the level at which they want their presentation to be aimed – EY, KS1, KS2 or KS3.

Ask student to design an engaging presentation to teach their younger peers the following:

1. What are microbes?
2. Where are microbes found?
3. Microbial shapes and structures
4. Microbes that are good or bad for humans

Suggest to students that their presentations should include amazing microbe facts, interactive elements or activities and they should make the presentation visually engaging for a younger audience.

Extension Activities

Divide the class into groups of 3 – 4 students. Each group should research and create a poster to reinforce learning on one of the following topics:

- 1 Choose a specific type of bacterium, virus or fungus e.g. *Salmonella*, *Influenza A* or *Penicillium*. The poster should include:
 - a. Structure of that microbe
 - b. The different places they can be found
 - c. How they affect humans in either a good or bad way
 - d. Any specific growth requirements of that group of microbes

OR

- 2 A timeline poster on the history of microbes. This poster may include:
 - a. 1676: van Leeuwenhoek discovers 'animalcules' using homemade microscope
 - b. 1796: Jenner discovers smallpox vaccination
 - c. 1850: Semmelweis advocated washing hands to stop the spread of disease
 - d. 1861: Pasteur publishes germ theory: the concept that germs cause disease
 - e. 1892: Ivanovski discovers viruses
 - f. 1905: Koch awarded Nobel Prize in Medicine for his work understanding tuberculosis and its causes
 - g. 1929: Fleming discovers antibiotics

Learning Consolidation

Check for understanding by asking students if the following statements are true or false.

1. There are two main types of microbes: bacteria and fungi?

Answer: False, there are three main types: bacteria, viruses and fungi.

2. Bacteria have three main shapes, cocci (balls), bacilli (rods) and spirals.

Answer: True.

3. Microbes are only in the food we eat.

Answer: False, there are microbes everywhere, floating around in the air we breathe, on the food we eat, in the water we drink and on the surface of and in our bodies, even inside volcanoes.

4. Microbes can be useful, harmful or both.

Answer: True.

