

Life processes

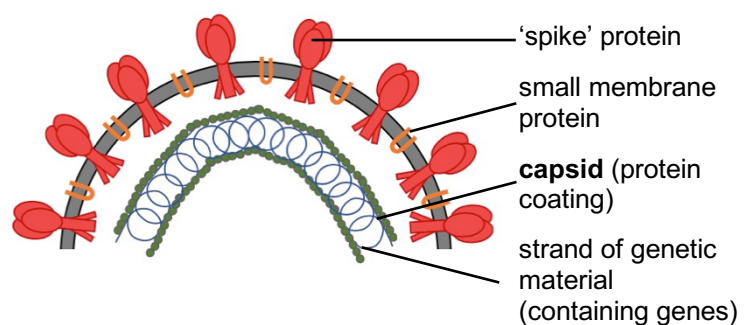
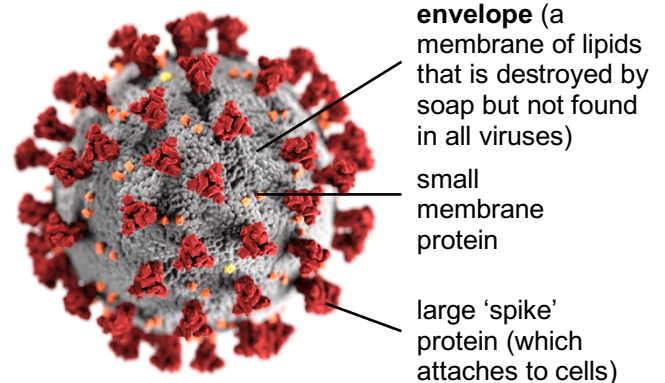
All living things carry out seven **life processes**: movement, respiration, sensitivity, growth, reproduction, excretion, nutrition. **Viruses** are tiny particles that do not do these and so are not classed as 'living'. A virus increases its numbers by getting inside a living cell and re-programming the cell to make copies of itself. This is how a virus **replicates** (rather than 'reproduces').

Pathogens

A virus called SARS-CoV-2 causes COVID-19. This is a **communicable disease** because it can be spread from person to person. Other communicable diseases caused by viruses include measles, AIDS and Ebola haemorrhagic fever.

Communicable diseases are caused by **pathogens**. Other examples of pathogens and their diseases include **bacteria** (e.g. tuberculosis, cholera) and **protists** (e.g. malaria).

SARS-CoV-2 is spread in tiny fluid droplets, produced in the lungs when people breathe, talk, sneeze or cough. Their weight makes most droplets fall the ground within about 2 m of a person, but droplets from coughs and sneezes travel further. Tuberculosis and measles also spread in this way.



Viral replication

The surface proteins on a virus attach to proteins on some cell membranes. Once attached, the virus is taken inside. Its strand of genetic material then instructs the cell to make new virus copies. If many new virus particles leave a cell at the same time, it destroys the cell (a process called **lysis**).

The genetic material of some viruses, such as HIV, can become part of the cell's genetic material. When the cell divides (to copy itself), the virus genetic material is also copied. Later, the virus can become active. (In viruses that infect bacteria, a virus hidden in the genetic material of the bacterium is in a **lysogenic cycle**, and a virus that destroys cells as copies of it are made is in a **lytic cycle**.)

Find out

I. 1. Use the New York Times <https://nyti.ms/2W1s4Gd> to answer the following questions.

- How do coronaviruses get their name? _____
- Name two other diseases caused by coronaviruses. _____
- What protein does the virus attach to on human cells? _____
- What is the virus' genetic material made of? _____

2. Complete this table. You will need to do some research.

Disease	Pathogen	How it spreads	Common effects
Ebola			fever and bleeding inside and outside the body
tuberculosis			
cholera			
AIDS			immune system failure
malaria			
COVID-19			fever, continuous cough
Chalara disease	fungus		
stomach ulcers	bacterium		open sores in the stomach lining

Test yourself

3. Circle the communicable diseases in this list.

cancer COVID-19 flu heart disease measles SARS-CoV-2 scurvy

4. Give the name of the part of a virus that protects its genetic material. _____

5. Explain whether SARS-CoV-2 follows a more lytic or lysogenic cycle. _____

Check-up

- Check your answers.
- Many posters tell people how to avoid getting COVID-19 (e.g. by washing hands frequently) but do not explain why scientists think these methods work. Design a poster that *explains* at least three ways to avoid COVID-19.



Answers

Note to home educators

The worksheet is designed to support understanding of communicable diseases. You may wish to share these objectives with students:

- Recall the structure of a virus and explain how its replication harms its host. (GCSE)
- Describe the difference between communicable and non-communicable diseases. (GCSE)
- Describe some diseases caused by different pathogens. (GCSE)
- Explain ways in which pathogens may be spread. (GCSE)
- Describe the lifecycle of a virus, including lysogenic and lytic pathways. (GCSE Biol)

To access this sheet, students will need a knowledge of cells and microorganisms.

It is suggested that students complete the worksheet independently, making use of the internet to complete questions 1 and 2. Questions 3 - 5 should be completed without help.

Most questions will be accessible by students in Years 8 and 9 but most of this sheet is drawn from GCSE 9-1 Science specifications (both Combined Science & Biology).

Other sheets in this series are at: <https://shwca.se/covid19science>

If you wish to check the answers, keep this part of the sheet away from the questions!

- I. 1. a. Its spikes make it look like a crown (or 'corona' in Latin)
b. Two of: colds, MERS, SARS
c. ACE-2
d. RNA (ribonucleic acid)

2.

Disease	Pathogen	How it spreads	Common effects
Ebola	virus	body fluids (e.g. blood)	fever and bleeding inside and outside the body
tuberculosis	bacterium	droplets in air	cough (containing blood) / lung damage
cholera	bacterium	water	severe diarrhoea
AIDS	virus	sexual intercourse	immune system failure
malaria	protist	mosquitoes	red blood cell / liver damage
COVID-19	virus	droplets in air	fever, continuous cough
Chalara disease	fungus	(spores carried by) air/wind	wounds on tree / leaves die early / top of tree dies
stomach ulcers	bacterium	food / oral-faecal / on feet of flies / touching mouth then others' food	open sores in the stomach lining

3. COVID-19, flu, measles (Note that SARS-CoV-2 is the name of a virus)

4. capsid

5. lytic; because the virus replicates and destroys the cells.

II. Posters could explain, for example:

- washing hands; soap destroys the virus' envelope
- staying 2 m away from people; most droplets fall to the ground within 2 m
- coughing/sneezing into a tissue or the crook of your elbow; to stop droplets going far
- wear mask; evidence suggests that this stops you spreading the virus
- stay at home if you feel unwell; to avoid spreading the virus
- don't touch eyes, nose, mouth; these are routes the virus can use to enter the body
- disinfect surfaces; disinfectants destroy the virus