Plenary Talk Placemat

Today I have learnt that …….

The skills I used in today's lesson were…
I could also use these skills in….

Be a reflective learner.

Discuss with a partner before you share it with the class.

I would like to find out more information about….

One thing I need to remember from today's lesson is…

Before this lesson I could already…

Three key words I have learned today are…

I was successful today when I…

Plenary - complete one of the sentences below

I was successful when I ……

A question I have about today's lesson is ……

Today I learnt ……

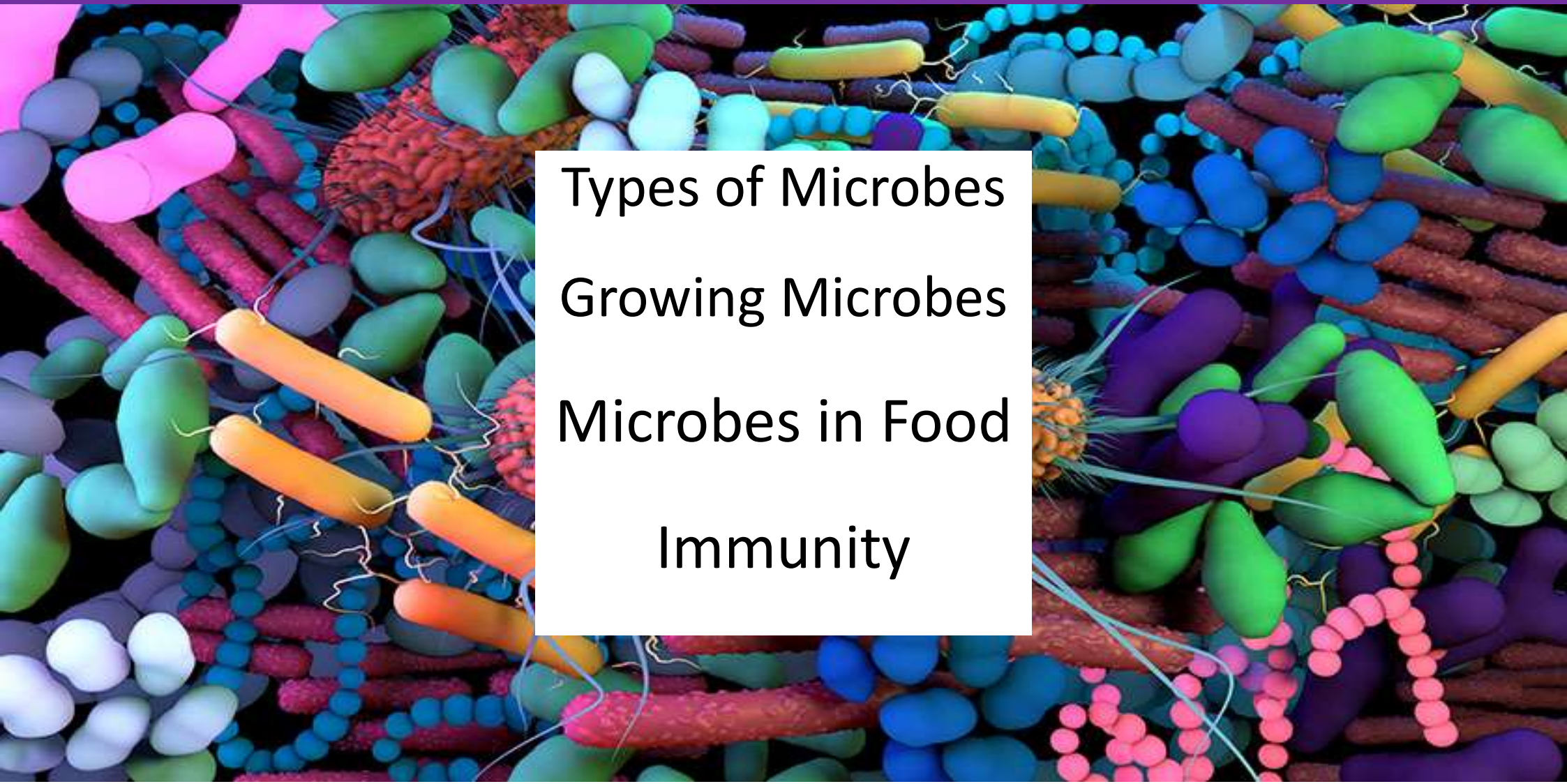
The part of the lesson I enjoyed the most was……

The skills I used in today's lesson were……

One thing I need to remember from today's lesson is……

Success Criteria

Science of the House - Microbes



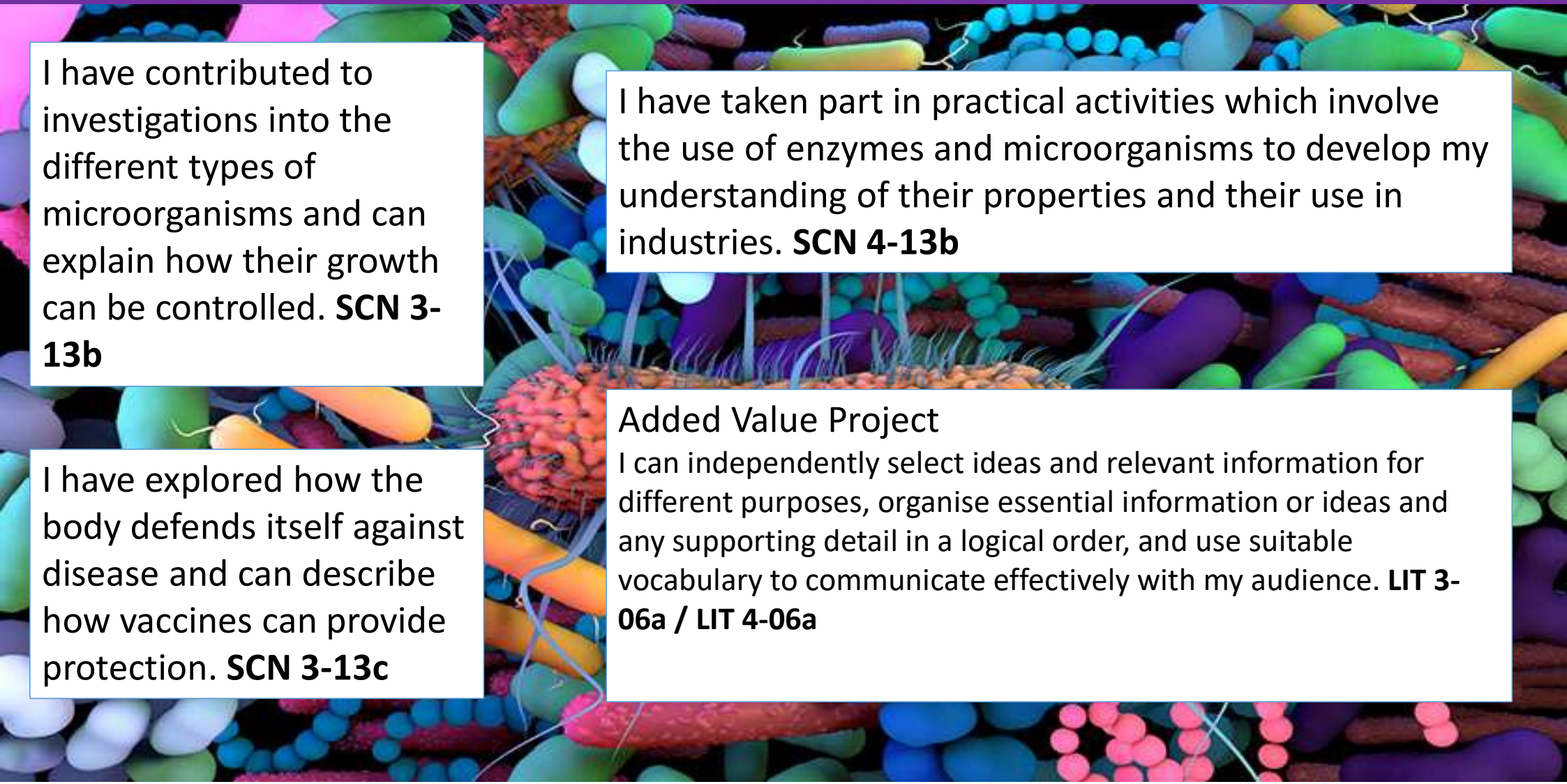
Types of Microbes

Growing Microbes

Microbes in Food

Immunity

Science of the House - Microbes



I have contributed to investigations into the different types of microorganisms and can explain how their growth can be controlled. **SCN 3-13b**

I have taken part in practical activities which involve the use of enzymes and microorganisms to develop my understanding of their properties and their use in industries. **SCN 4-13b**

I have explored how the body defends itself against disease and can describe how vaccines can provide protection. **SCN 3-13c**

Added Value Project

I can independently select ideas and relevant information for different purposes, organise essential information or ideas and any supporting detail in a logical order, and use suitable vocabulary to communicate effectively with my audience. **LIT 3-06a / LIT 4-06a**

BBC Bitesize class-clips

All resources:
https://www.bbc.com/bitesize/topics/zfxxsbk/resources/1

Clip compilation 44s: https://www.bbc.com/bitesize/clips/zggvr82

Smallpox vaccine: Edward Jenner ~4min https://www.bbc.com/bitesize/clips/z42jmp3

Seeing the bacteria on hands ~1min https://www.bbc.com/bitesize/clips/z34rkqt

Sir Alexander Fleming: Discovering Penicillin ~3min https://www.bbc.com/bitesize/clips/zwm76sg

Bacteria on the skin ~1min https://www.bbc.com/bitesize/clips/ztvfb9q

The importance of hand washing in food hygiene ~5min https://www.bbc.com/bitesize/clips/zr7jmp3

Time-lapse decaying fruit ~20s https://www.bbc.com/bitesize/clips/zwx76sg

Understanding the size of bacteria ~1min https://www.bbc.com/bitesize/clips/zkptsbk

What germs can be found on the surface of your hand ~2min https://www.bbc.com/bitesize/clips/zmcg9j6

Types of Microbes

24/09/2024

Starter:

What causes rotting and mould?

Types of Microbes

24/09/2024

Learning Intentions:

- To identify the different types of microbes.
- To research and describe the structure of microbes.
- To compare the different types of microbes.
- To set up an experiment into food decay

Microbes have been around longer than anything else on Earth, longer even than dinosaurs.

If you imagine Earth began as a single day:

Microbes appeared at 5am, Dinosaurs appeared at 10pm...
humans appeared seconds before midnight

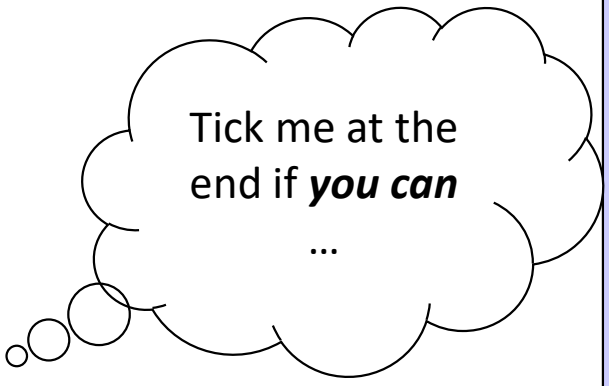
MICROBIOLOGY SOCIETY

Types of Microbes

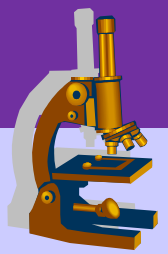
24/09/2024

Success Criteria

- ❑I can state the names and identify the different types of microbes
- ❑I can describe the structure of microbes
- ❑I can compare the different types of microbes



Types of Microbes



A microbe (also called a microorganism) is an organism which needs a <u>microscope</u> to be seen.

Can you guess the 3 types of microbes from the pictures?

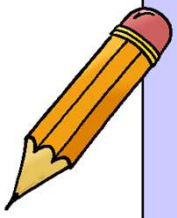
Fungi

Viruses

Bacteria

Types of Microbes

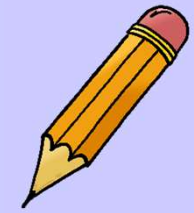
- A micro-organism is a Small living thing
- We can see micro-organisms using a microscope
- The different groups are:
  - bacteria
  - fungi
  - viruses

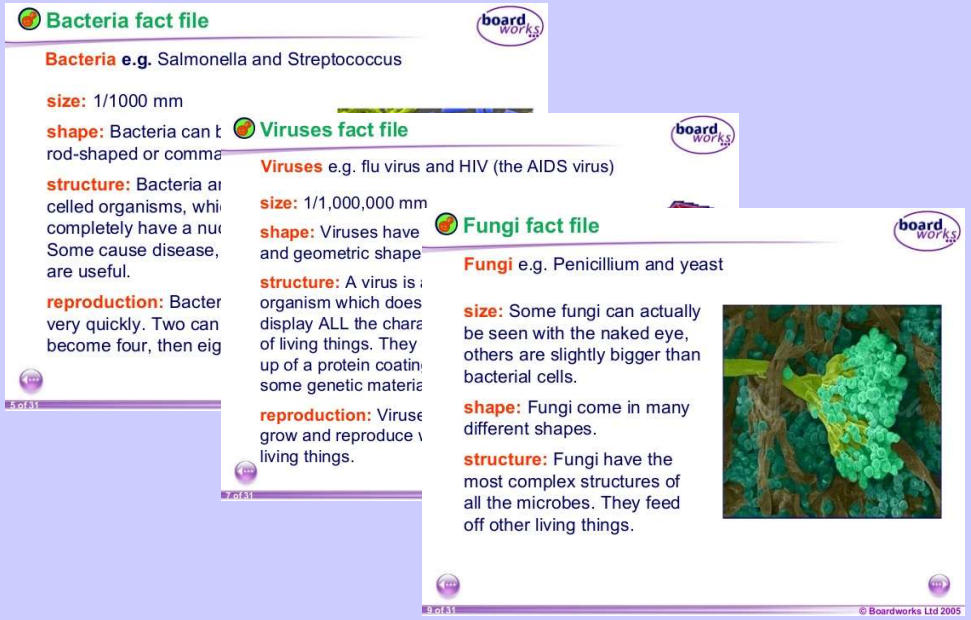


Types of Microbes

- Using the fact sheets on your table you need to complete your **fact file** about the different types of microbes.
- You must also include a labelled diagram of one microbe for each of the categories: Bacteria, Fungi, Virus

Extra challenge: Create 10 true or false questions on the different types of microbes.





Types of Microbes

Page 5

Microbe	Examples	Structure	Extra Info
Fungi			
Bacteria			
Virus			

Types of Microbes

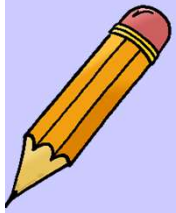
You must include a labelled diagram of one microbe for each of the categories:

Bacteria	Fungi	Virus

Types of Microbes

Extension Activity

Read the following passage and then answer the questions below



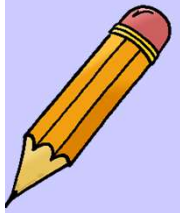
You may think that the world is full of dangerous, disease-causing microbes. In fact many microbes are useful to us whilst others are not harmful or useful.
Organisms, which cause diseases, are called **pathogens**. They can be divided into 4 main groups

- **viruses** cause the common cold, flu, measles, chicken pox and AIDS
- **bacteria** cause Salmonella poisoning, tetanus and cholera
- **protists** cause malaria and amoebic dysentery
- **fungi** cause athletes foot and ring worm

Pathogens can spread in many ways. **By droplets in the air** when you sneeze e.g. flu and the cold spread in this way. **By touch** e.g. sharing towels with infected people can spread athletes foot. **By faeces** (solid waste) e.g. germs in faeces can sometimes get into food and drinking water. Cholera and dysentery spread in this way. **By animals** e.g. rats, mice, cockroaches and flies can spread diseases to humans like malaria. **By blood** e.g. blood-to-blood contact in humans can spread AIDS.

Types of Microbes

Extension Activity



a) What is a pathogen?

A pathogen is an organism which cause diseases.

b) What are the four main groups of pathogens?

The four main groups of pathogens are bacteria, fungi, viruses and protists

c) Using the passage, name two diseases caused by viruses and two diseases caused by fungi.

Viruses: common cold, flu, measles, chicken pox and AIDS

Fungi: athletes foot and ringworm

Time lapse food decay

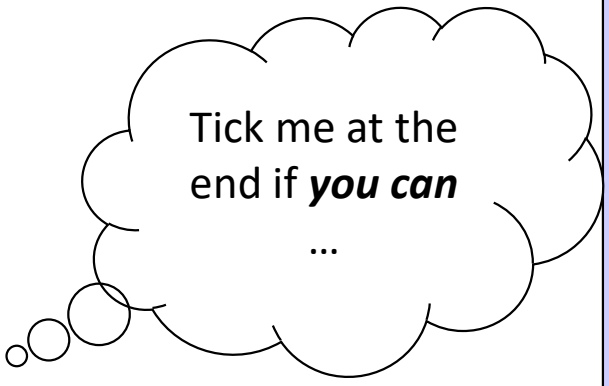
- https://www.youtube.com/watch?v=c0En-_BVbGc

Types of Microbes

24/09/2024

Success Criteria

- ❑I can state the names and identify the different types of microbes
- ❑I can describe the structure of microbes
- ❑I can compare the different types of microbes



BBC Learn video: Microorganisms and bacteria

https://www.youtube.com/watch?v=FnUQrdTRdB0

- **Can you now....**

-Identify the different types of microbes?

-Describe the structure of microbes?

-Compare the different types of microbes?

Pathogenic means "causes disease"

Microbe	Examples	Structure	Extra Info
Fungi ✓	Yeast (Moulds) (Mushrooms)	Yeast are unicellular, round, have a nucleus, cell wall and cell membrane. ✓	Yeast reproduce by budding. Moulds and mushrooms are also fungi. They reproduce by making spores. Fungi can be pathogenic or helpful ✓
Bacteria ✓	Salmonella Streptococcus Lactobacillus	Bacteria can be round, spiral, rod or curved. They have a cell membrane, cell wall, DNA but no nucleus. ✓	Salmonella is a pathogenic bacteria. Other bacterium can be used to make foods or used in genetic engineering. Bacteria reproduce by budding. ✓
Virus ✓	Cold Flu HIV	Viruses can have regular or geometric shapes and have a protein coat instead of a cell wall. They have no nucleus but have DNA. ✓	Viruses are mainly pathogenic. They can only reproduce inside a host cell. ✓

Microscopes

24/09/2024

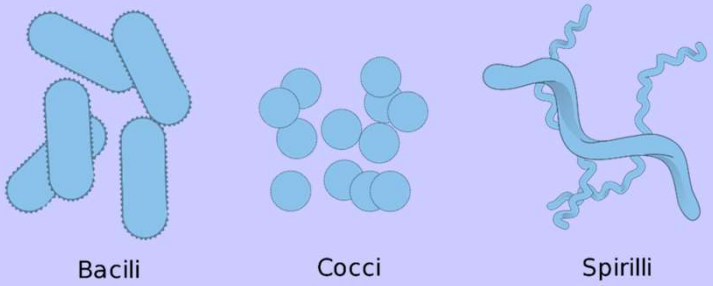
Starter:

What do you think the size order of our three types of microbes might be?

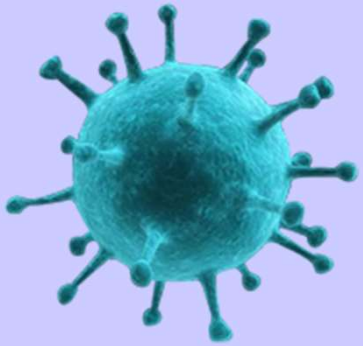
(number them 1 – 3: 1 = smallest, 3 = biggest)

1. Virus
2. Bacteria
3. Fungi

Bacteria



Viruses



Fungi

Microscopes

24/09/2024

Learning Intentions:

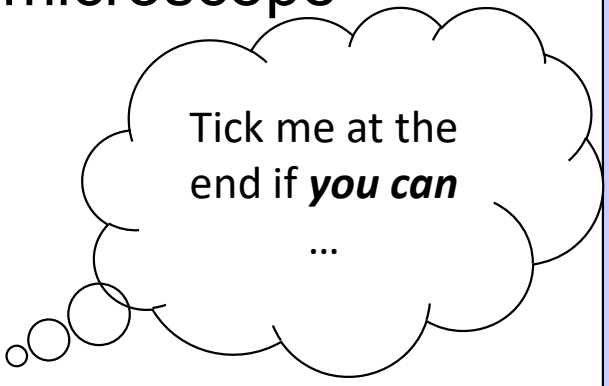
- To compare the sizes of bacteria, viruses and fungi.
- To stain yeast cells
- To look at stained yeast cells under a microscope.
- To use numeracy skills to solve simple size and scale problems

Microscopes

24/09/2024

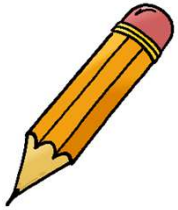
Success Criteria

- ❑I can compare the sizes of bacteria, viruses and fungi
- ❑I can stain yeast cells and identify them under a microscope

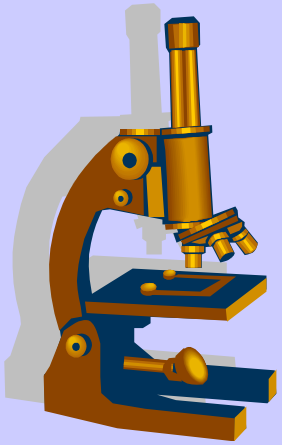


Microscopes

- Cells are very ___small___.
- A microscope is used to make cells appear ___bigger___.



Micro-organisms such as bacteria and yeast are very **small**. You can use a microscope to look at some types of micro-organism.



Examples

White Blood Cell

10 micrometers

1×10^{-5} meters

These mass murderers are also known as leukocytes. There are many different types of this disease-fighting cell. The most common type, the neutrophil, has multiple nuclei. The largest type, the macrophage, has a diameter of a whopping 21 µm. That's over double the size of the neutrophil!

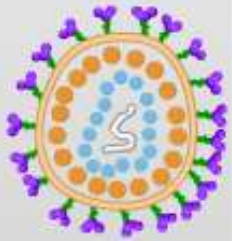
White Blood Cell

HIV

90 nanometers

9×10^{-8} meters

HIV infects 0.6% of the world's population and causes AIDS. Although a single HIV virus is very small, in fact, so small that not a single human being on the face of this planet can see it with their naked eye, it can still kill.



HIV

Largest Bacteria

750 micrometers

7.5×10^{-4} meters

The largest bacteria, which is Thiomargarita namibiensis, is almost one millimeter in length. It lives in the ocean off the coast of Namibia. Can you imagine being in the ocean, and seeing these things? They're very visible!

Largest Bacteria

Hepatitis B Virus

42 nanometers

4.2×10^{-8} meters

Hepatitis B infects a lot of humans. In fact, almost one third of the world population has been infected at some point. This virus causes vomiting, liver inflammation, and possibly death.

Hepatitis B Virus

Smallest Thing Visible to an Electron Microscope

50 picometers

5×10^{-11} meters

Electron microscopes allow us to see very small things (like atoms) that would otherwise be invisible because they are smaller than the wavelength of visible light.

Smallest Thing Visible to an Electron Microscope

Smallest Thing Visible to an Optical Microscope

200 nanometers

2×10^{-7} meters

Optical microscopes cannot see objects smaller than 200 nanometers because the wavelengths of visible light will pass right through them.

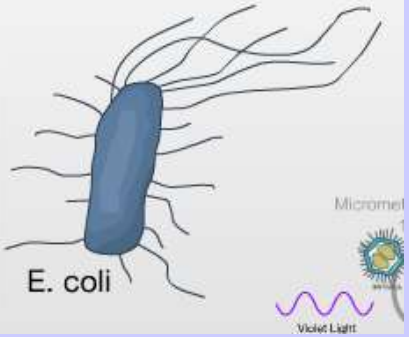
Smallest Thing Visible to an Optical Microscope

E. coli

2 micrometers

2×10^{-6} meters

E. coli are usually harmless and live in your intestines, making wonderful vitamin K_2. They are in almost everyone's intestines. In fact, they colonize in babies' intestines just two days after they are born! Now that's pretty fast!



E. coli

Mimivirus

400 nanometers

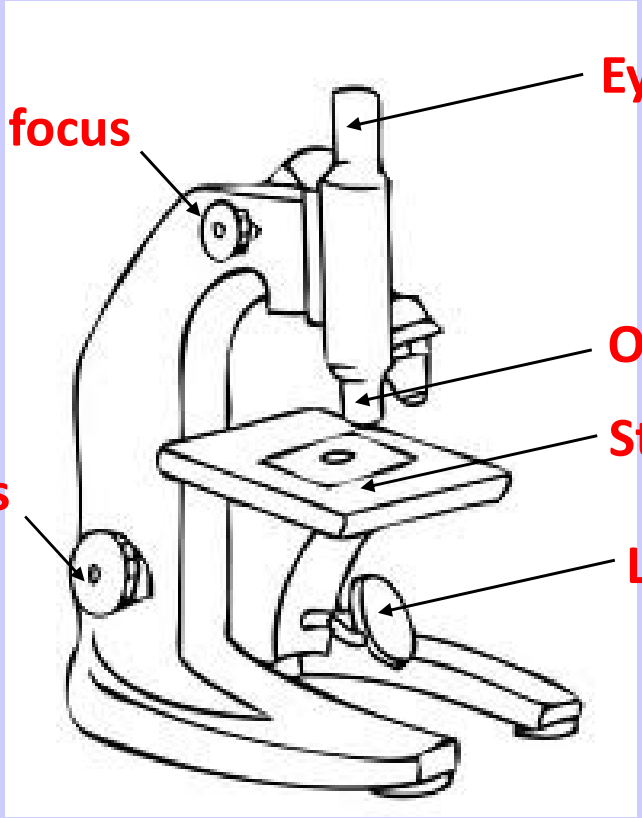
4×10^{-7} meters

This little thingy was discovered in 1992 within an amoeba, which is only 500 times larger. Mimivirus used to be the largest virus known, but now that is the Megavirus.

Mimivirus

Recap: Microscopes

- Label the parts of the microscope:



BBC Learn video: Microscopy

https://www.youtube.com/watch?v=WIVuogs3VtM&index=17&list=PLcvEcrsF_9zI9AX2fthVs9Pi8Mv-T3En3

Staining Yeast Cells

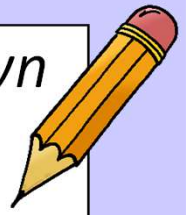
Aim: To investigate the appearance of yeast cells under a microscope.

Method: *(What did you do?)*

- Add 1 drop of **yeast** sample to a clean **microscope** slide
- Add 1 drop of **methylene blue** stain to the slide
- Place the **cover slip** over the sample
- Use the **lowest** magnification on your microscope to bring the sample in to focus

Staining Yeast Cells

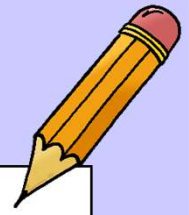
Results?: *Draw a diagram of the yeast cells under the microscope, write down the magnification you used.*



Magnification: _____

Staining Yeast Cells

Aim: To investigate the appearance of yeast cells under a microscope.



Conclusion: *(answer your aim)*

Microbes Numeracy

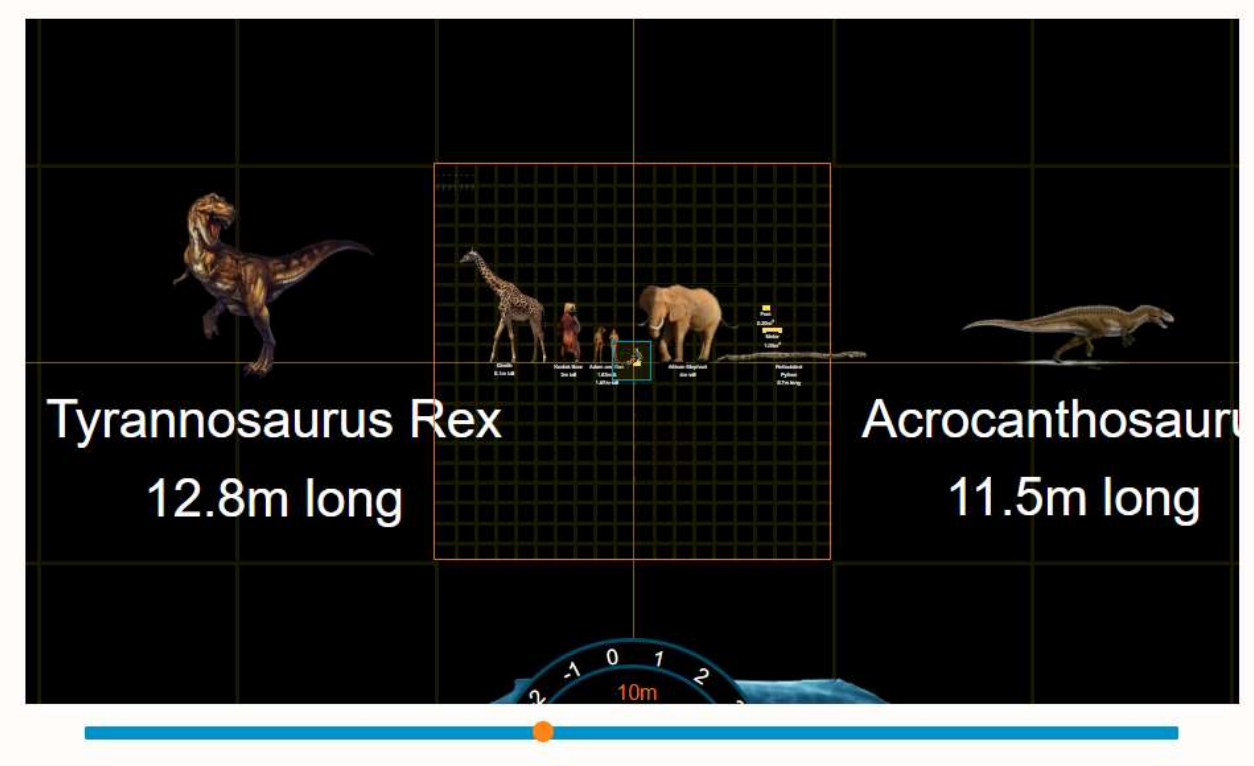
We use micrometres to measure microbes 1mm = 1000µm

To change mm to µm we Multiply by 1000

To change µm to mm we Divide by 1000

How big are microbes?

- The scale of the Universe:
- Magnifying The Universe animation



Plenary Talk Placemat

Today I have learnt that …….

The skills I used in today's lesson were…
I could also use these skills in….

Be a reflective learner.

Discuss with a partner before you share it with the class.

I would like to find out more information about….

One thing I need to remember from today's lesson is…

Before this lesson I could already…

Three key words I have learned today are…

I was successful today when I…

Microbes Numeracy

24/09/2024

Starter:

1. How many micrometers (µm) are there in one millimetre (mm)?

   1000 µm

2. The HPV virus measures 5 µm wide. What is its width in mm? (show your working)

   0.005 mm

3. The bacterium which causes TB is 0.026mm long. Write down its length in µm. (show your working)

   26 µm

Microbes Numeracy

1. What are the sizes in mm of the bacteria mentioned in the passage? (1)

E.Coli 0.002 mm

Thiomargarita namibiensis 0.75 mm

b. How many times bigger are Thiomargarita namibiensis than E. Coli bacteria?

375 times bigger

Working:

E. Coli = 2 micrometers (µm)

1mm = 1000 µm

Therefore, 2 µm = 2 ÷ 1000 = 0.002mm

Thiomargarita namibiensis = 750µm

1mm = 1000 µm

Therefore, 750µm = 750 ÷ 1000 = 0.75mm

Working:

E. Coli = 2 µm *(= 0.002mm)*

Thiomargarita namibiensis = 750µm *(=0.75mm)*

Therefore, 750µm ÷ 2µm = 375 times bigger

OR 0.75mm ÷ 0.002mm = 375 times bigger

Microbes Numeracy

2. Bacteria make more bacteria by dividing. If the conditions are right, bacteria are able to divide every 20 minutes. If there is one single E. coli bacterium on a piece of raw chicken at 11am in the morning, how many E. coli can we expect by 1pm on the same day?

64 bacteria

Working:

How much time passes between 11am and 1pm =

2 hours = 2 x 60min = 120 minutes

How many blocks of 20 minutes pass in that time?

120 ÷ 20 = 6

This means 1 bacteria doubles 6 times!

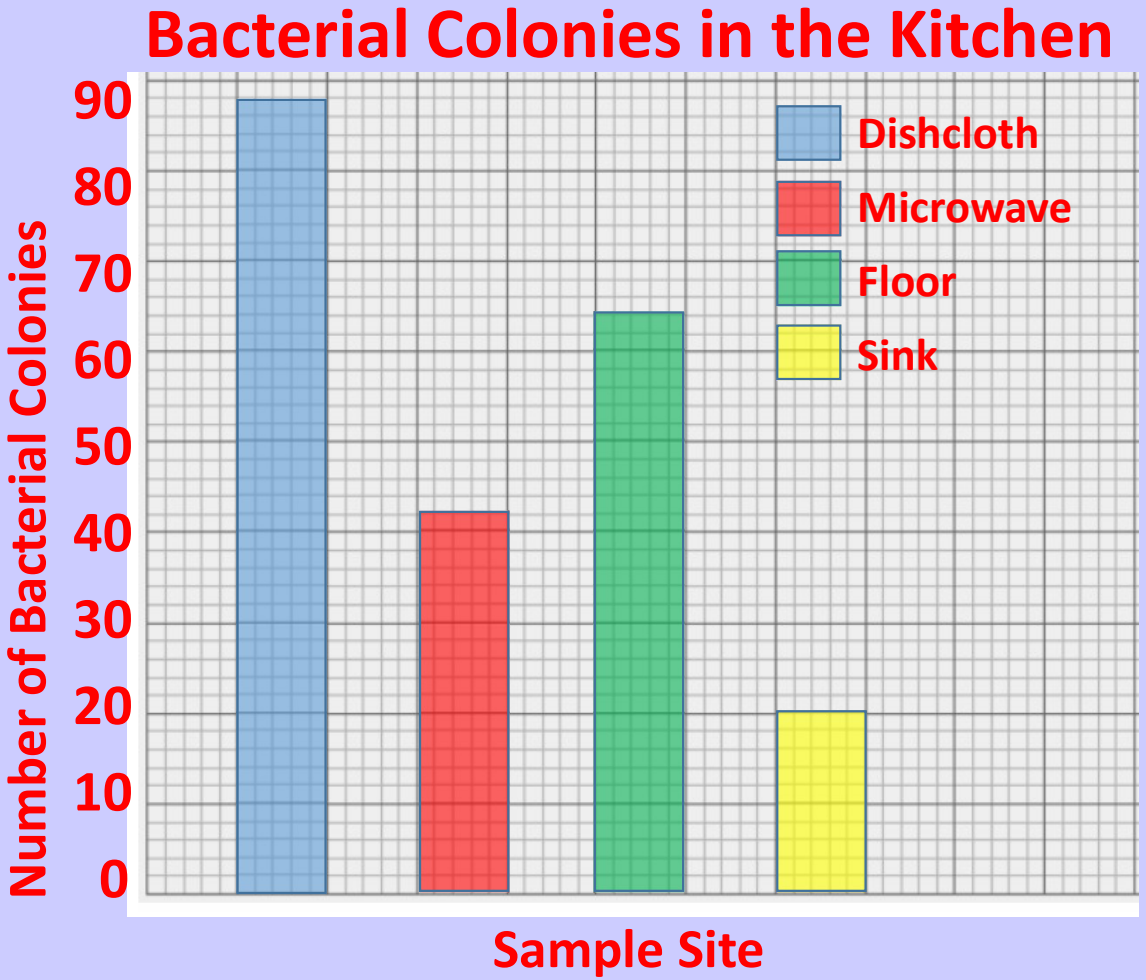
Time (minutes)	**0**	**20**	**40**	**60**	**80**	**100**	**120**
No. of bacteria	1	2	4	8	16	32	64

Extra challenge – draw a line graph to show your results (see back of booklet for graph paper)

Microbes Numeracy

3. Bar Graph

Sample site	Number of bacterial colonies
Dishcloth	88
Microwave	42
Floor	64
Sink	20

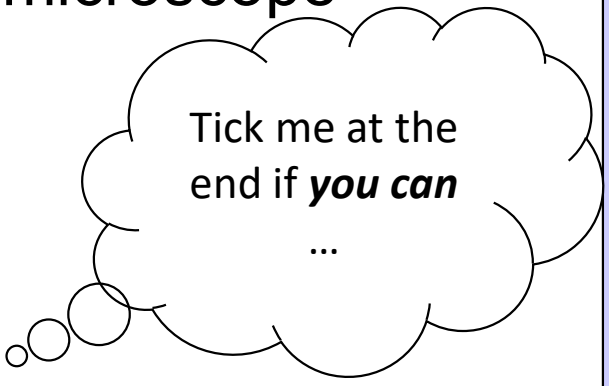


Microscopes

24/09/2024

Success Criteria

- ❑I can compare the sizes of bacteria, viruses and fungi
- ❑I can stain yeast cells and identify them under a microscope



Aseptic Technique

24/09/2024

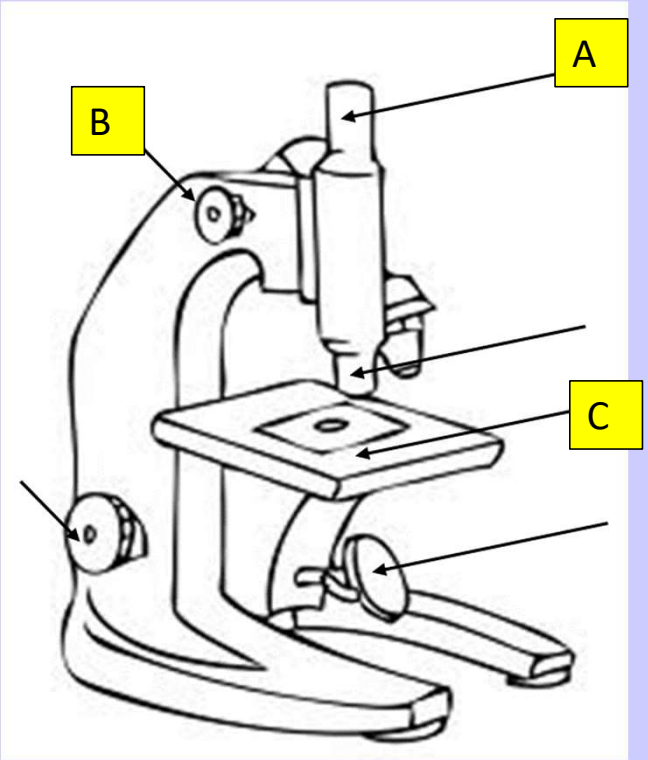
Starter:

Label parts A-C on the microscope.

A _____

B _____

C _____



Aseptic Technique

24/09/2024

Learning Intentions:

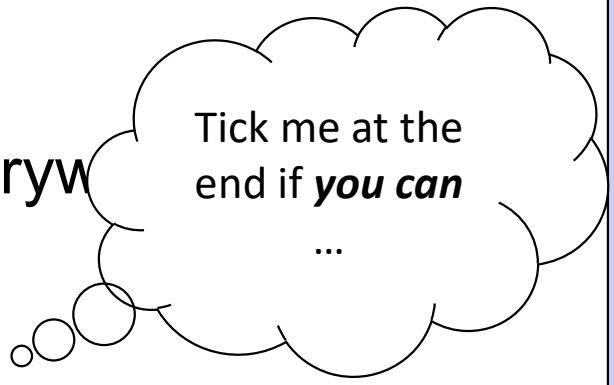
- To define contamination
- To investigate hand hygiene
- To describe aseptic technique
- To identify ways to prevent contamination of **experiments**
- To identify ways to prevent contamination of **experimenter!**
- Set up an experiment to show why aseptic technique is important

Aseptic Technique

24/09/2024

Success Criteria

- ❑I can define contamination
- ❑I can describe one or more aseptic technique
- ❑I can protect an experiment from contamination
- ❑I can show by experiment that microbes are everyw



Aseptic Technique

- Aseptic means the absence of microorganisms that can cause disease. Healthcare professionals use aseptic technique to protect patients, themselves and the public from infection.
- Healthcare professionals include doctors, nurses, microbiologists and many others.

Others such as: dentists, opticians, vets, phlebotomists, pharmacists, pharmacologists, health visitors, midwives, surgeons, podiatrists)

Working with micro-organisms

- Sterile techniques must be used when working with micro-organisms
- This prevents **contamination**

Examples of Aseptic Technique

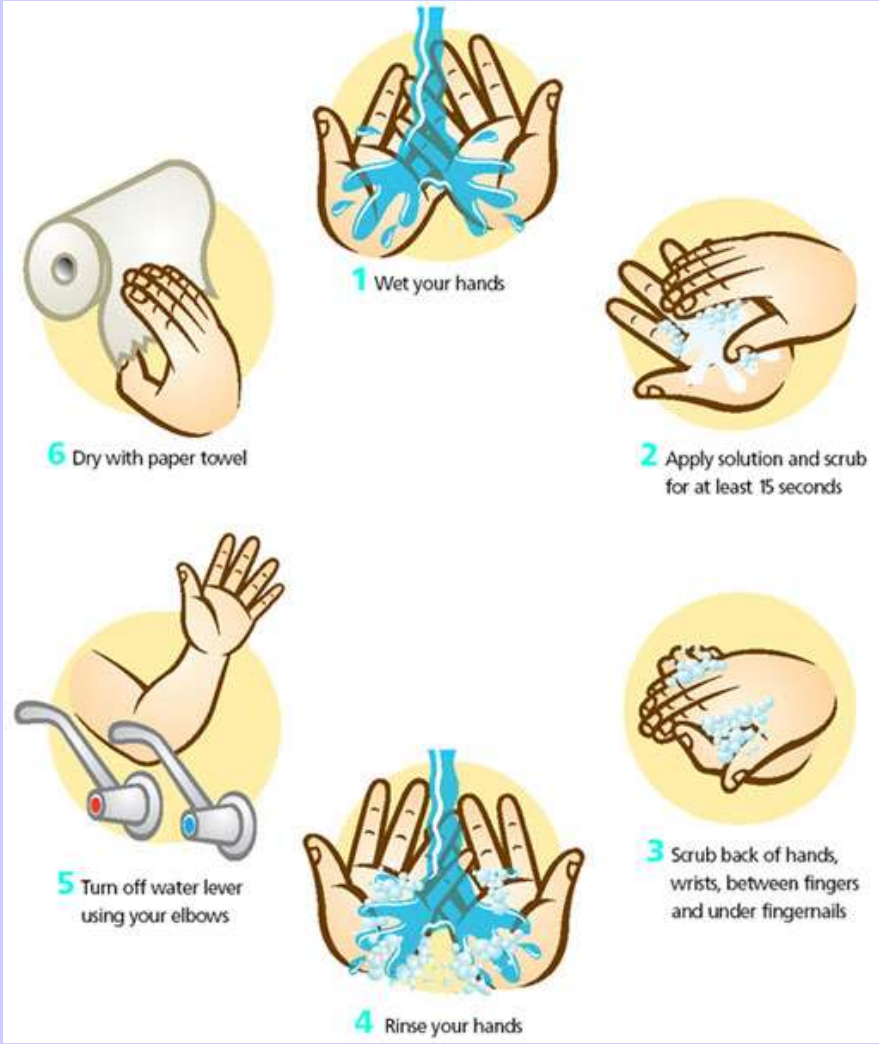
Lab coats

Why do we wear lab coats?

Examples of Aseptic Technique

Hand washing

Why do we wash our hands?



Examples of Aseptic Technique

Disinfect surfaces

Surfaces should be smooth and non-absorbent

- They should be cleaned before and after experiments **to kill microbes**

Why do we disinfect surfaces?

Examples of Aseptic Technique

Autoclave equipment

- Autoclaves disinfect glassware by heating them at high temperature and/or pressure.
- This sterilises lab equipment

Why do we use an autoclave?

Examples of Aseptic Technique

Petri dishes closed

- Sterile petri dishes should be kept closed until ready to use.
- This prevents entry of micro-organisms

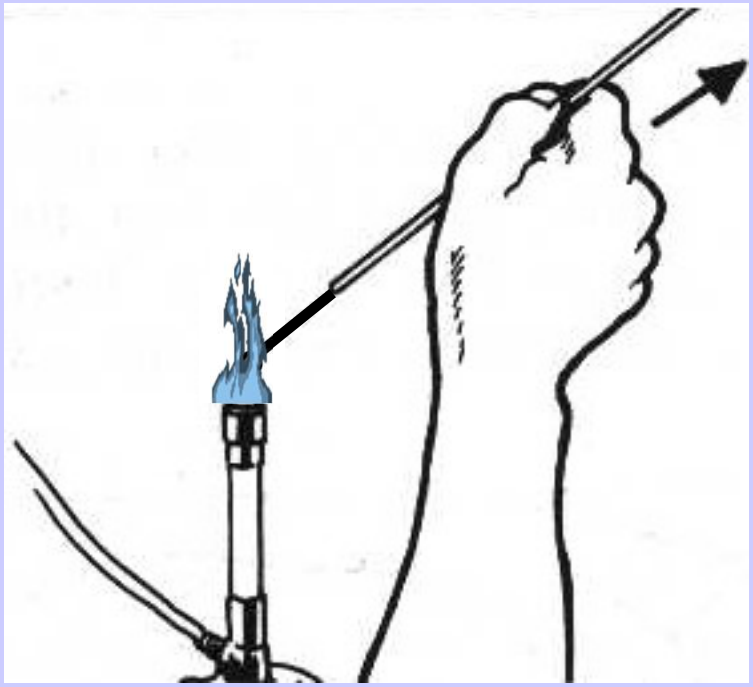
Why do we ensure petri dishes are closed?

Examples of Aseptic Technique

Flaming the wire loop

- Flamed before and after use **to destroy unwanted microbes**

Why do we flame the wire loop?



Petri-dish shielded by lid

- The petri-dish lid should be held over the dish during inoculation
- This prevents entry of contaminants

Petri-dish sealed

- The petri-dish should be sealed with tape after inoculation to **prevent entry and exit of microbes**

- *It is important that the dish is not sealed the whole way around. Why?*

• The microbes need oxygen to grow

Bin lined

- The bin should be lined with an appropriate bag labelled "biohazard"
- This allows safe disposal of used petri dishes

Examples of Aseptic Technique

- Wear a Lab coat
- Wash your Hands
- Disinfect surfaces
- Autoclave equipment
- Ensure petri dish is Closed
- Flame the Wire loop

Hand Hygiene Experiment

Aim: To investigate the effect of handwashing on pathogens under UV light.

Method:

1. Apply a small drop of hand gel to your hands and rub them together
2. Let the gel dry
3. Wash your hands as you would normally
4. Look at your hands under the UV torch

Hand Hygiene Experiment

Results:

How clean are your hands?

Watch the hand washing video or look at the guide on the next slide.

Wash your hands again and check to see if you are cleaner.

https://www.nhs.uk/live-well/healthy-body/best-way-to-wash-your-hands/

Hand Hygiene Experiment

Conclusion: *what happened to the pathogens when you washed your hands?*

WHO guidelines

More facts!

The number of bacteria can double in 20 minutes and after one day without hand washing; a single bacterium can multiply 2 billion, trillion times!

90% of germs on hands are found under the nails!

Gross but true……

A study found that 30% of all people didn't wash their hands after using a public bathroom - although 90% claimed they do.

Just think what may be on their hands!!

MICROBIOLOGY SOCIETY

Aseptic Technique Quiz

Question 1: When are aseptic techniques used?

A. When working with bacteria only.
B. When working with septic tanks.
C. When working with bacteria and fungi.

Aseptic Technique Quiz

Question 2: What is a pathogen?

A. A microorganism that is harmful to humans.

B. A microorganism that is not harmful to humans.

C. A microorganism that can be grown.

Aseptic Technique Quiz

Question 3: Why are benches wiped with alcohol?

A. To kill microorganisms in the air.

B. To kill microorganisms on the bench.

C. To clean the bench.

Aseptic Technique Quiz

Question 4: What is used to sterilise used equipment?

A. Oven
B. Hot water
C. Autoclave

Aseptic Technique Quiz

Question 5: Why is the Petri dish lid only partially lifted?

A. To prevent the entry of heat.

B. To allow microorganisms from the air in.

C. To prevent the entry of microorganisms from the air.

Aseptic Technique Quiz

Question 6: At what temperature are bacteria grown?

A. Below 37°C.

B. Above 37°C

C. It doesn't matter

Aseptic Technique Quiz

Question 7: Which of the following is the correct way to seal a petri dish?

A. Elastic band

B. Two strips of tape from top to bottom

C. Tape around the circumference of the dish

Aseptic Technique Quiz

Question 8: Which symbol means “biohazard”?

A

B

C

(A is for radioactive material and C is for toxic material)

Aseptic Technique Quiz

Question 9: What time should be spent washing your hands(WHO guidelines)?

A. 40 to 60 seconds

B. 60 to 80 seconds

C. 20 to 40 seconds

Aseptic Technique Quiz

Question 10 : When should hands be washed thoroughly?

A. Before, during, and after preparing food, after using the toilet and after handling pet food or pet treats

B. Before and after caring for someone who is sick, before eating food and after touching an animal, animal feed, or animal waste

C. All of the above

Hand Hygiene

Did you know?

- We have between 2 and 10 million bacteria between fingertip and elbow
- Damp hands spread 1,000 times more germs than dry hands
- The number of germs on your fingertips doubles after you use the toilet
- Germs can stay alive on hands for up to three hours
- Millions of germs hide under watches and bracelets and there could be as many germs under your ring as there are people in Europe.

source: The Food and Drink Federation

Plenary Talk Placemat

Today I have learnt that …….

The skills I used in today's lesson were…
I could also use these skills in….

Be a reflective learner.

Discuss with a partner before you share it with the class.

I would like to find out more information about….

One thing I need to remember from today's lesson is…

Before this lesson I could already…

Three key words I have learned today are…

I was successful today when I…

Growing Microbes

24/09/2024

Starter:

1. Describe what is meant by contamination.

2. State two ways to prevent the spread/growth of microorganisms.

3. Why is it important to wash your hands?

Growing Microbes

24/09/2024

Learning Intentions:

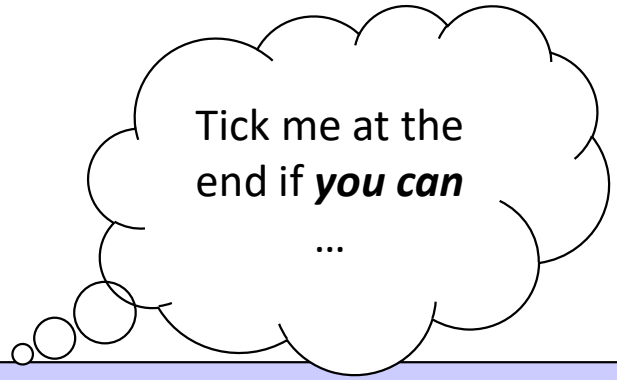
- Use an appropriate technique to grow microbes.
- Explain the importance of hand washing in preventing the spread of microbes.
- Understand the difference between direct and indirect spread of microbes

Growing Microbes

24/09/2024

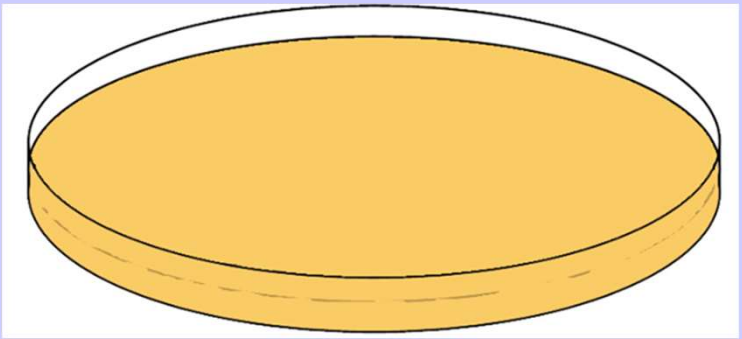
Success Criteria

- ❑I can grow microbes on an agar plate
- ❑I can explain the importance of hand hygiene
- ❑I can describe the difference between the direct and indirect spread of microbes



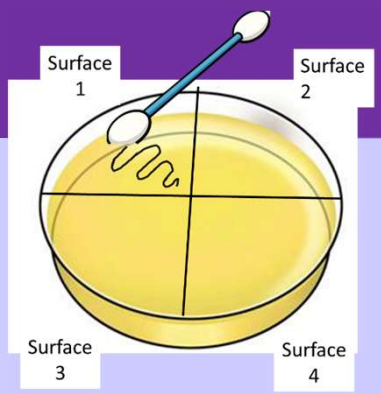
Growing Microorganisms

Microbes are found almost everywhere, but they are mostly far too small to be seen by the naked eye.



You are going to grow microbes from different places by supplying them with suitable growth conditions.

Growing Microorganisms

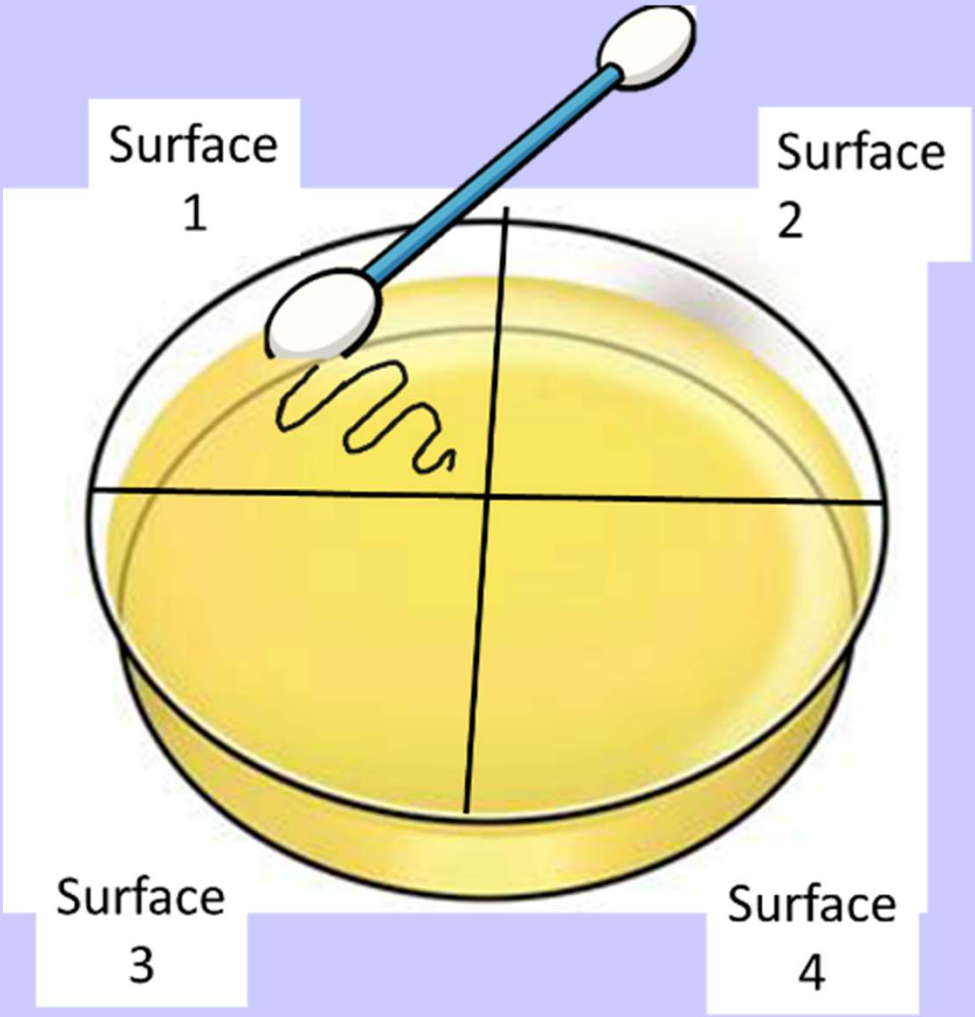


Aim: To investigate the microorganisms in the surrounding environment

Method:

1. Split your plate into 4 Sections – remember to write on the bottom of the plate!
2. Take a swab and rub it on one section.
3. Repeat this with a fresh bud on different surfaces.
4. Put used buds in the discard jar then carefully seal your plate with two pieces of sellotape.
5. incubate until next lesson.

Growing Microorganisms



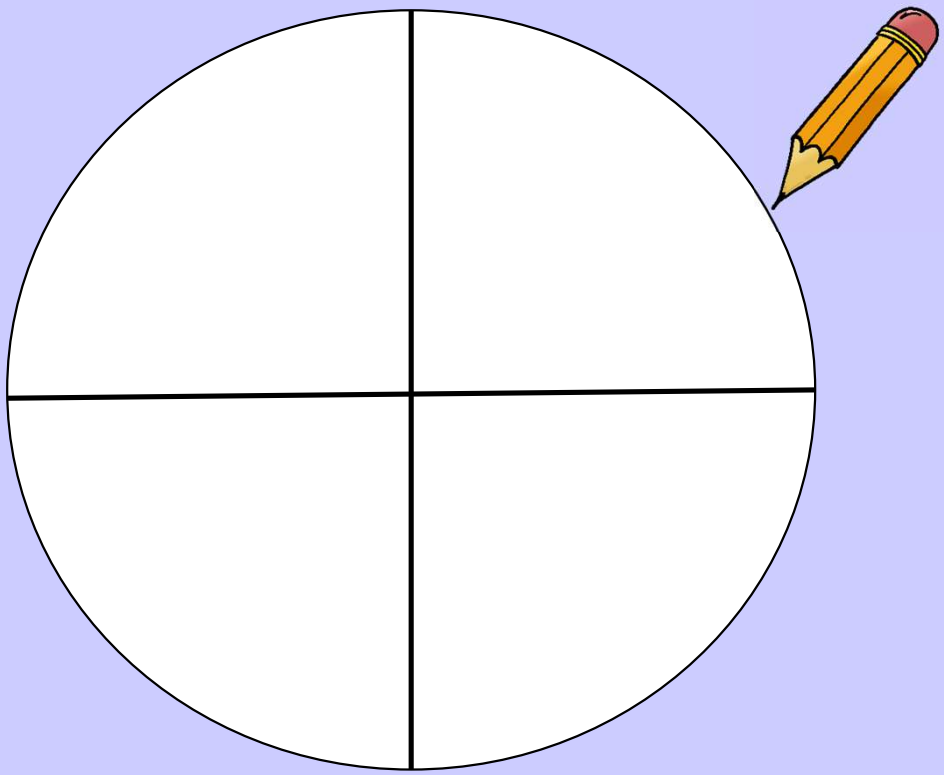
Growing Microorganisms

Results:

1. Collect your agar plate from last lesson. DO NOT take the lid off!

2. How many different colonies can you count?

3. **Draw a picture of your plate in your booklet.**



Growing Microorganisms

Aim: To investigate the microorganisms in the surrounding environment

Conclusion:

Write a conclusion for your experiment which answers the aim.

Evaluation:

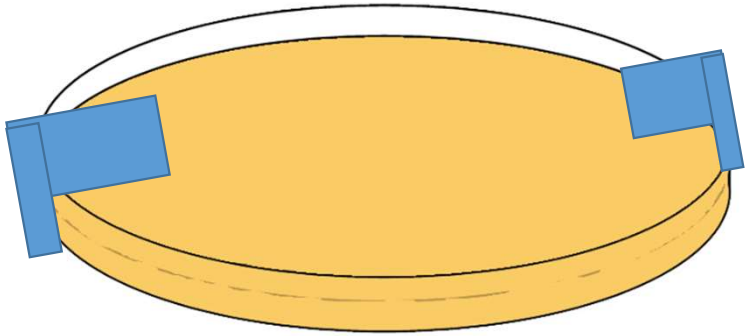
If you were to do the experiment again, what would you do differently? How could you make your experiment more reliable? Should you have used a control?

Growing Microorganisms in the Air - Demonstration

Aim: To investigate the microorganisms in the air.

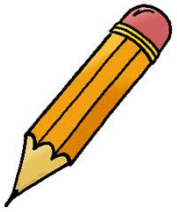
Method:

- Your teacher will label the underside of a petri-dish with todays date.
- Choose a suitable place to leave the dish open to the air
- At the end of the lesson, tape the lid onto the dish and incubate.



Growing Microorganisms in the Air - Demonstration

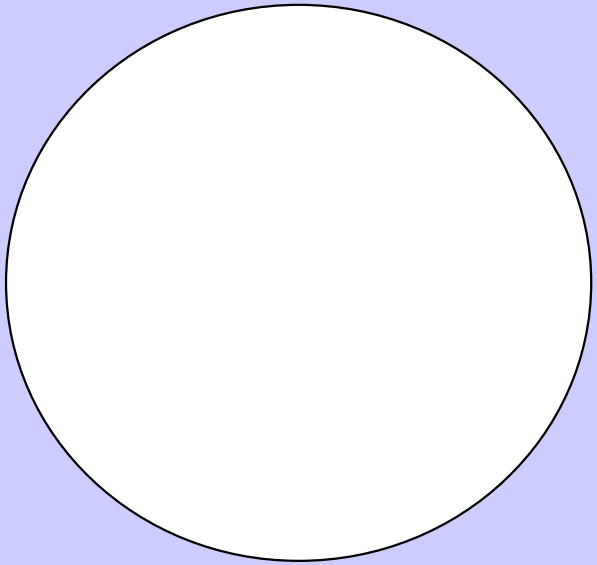
Results:



Collect your agar plate from last lesson. DO NOT take the lid off!

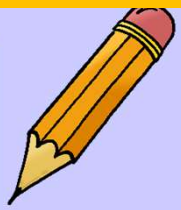
How many different colonies can you count?

Draw your agar plate once the microbes have grown.



Growing Microorganisms

Aim: To investigate the microorganisms in the air

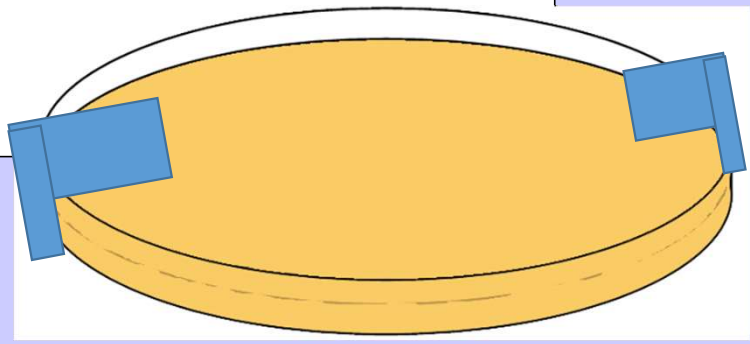


Conclusion:

Write a conclusion for your experiment which answers the aim.

Evaluation:

If you were to do the experiment again, what would you do differently?



Extension Activity – Complete the table

Page 16

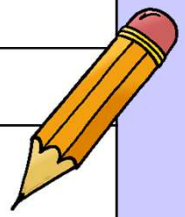
Aseptic Technique	Reason measure is needed
No eating or drinking in the lab.	
Wiping bench with disinfectant/alcohol.	
Not growing microorganisms at body temperature.	
Using sterile loops when transferring cultures.	
Flaming culture bottle necks to prevent contamination.	
Sterilising (using an autoclave) or disposing of all used equipment.	
Washing hands thoroughly	


Prevents scientist eating pathogens
Prevents contamination when transferring cultures
Prevents microbes dangerous to humans from growing
Destroys microbes that have been grown
Kills microbes on work surface
Prevents microbes from skin from contaminating experiments
Prevents microbes entering or leaving the culture bottle

Extension Activity – Check your answers

Page 16

Aseptic technique	Reason
No eating or drinking in the lab	Prevents scientist eating pathogens
Wiping bench with disinfectant/alcohol	Kills microbes on work surface
Not growing microorganisms at body temperature	Prevents microbes dangerous to humans from growing
Using sterile loops when transferring cultures	Prevents contamination when transferring cultures
Flaming culture bottle necks to prevent contamination	Prevents microbes entering or leaving the culture bottle
Sterilising (using an autoclave) or disposing of all used equipment	Destroys microbes that have been grown
Washing hands thoroughly	Prevents microbes from skin from contaminating experiments



Extra

Sneeze game:

Arrows on keyboard to move

Space bar to sneeze

Adverts play first ☹

Sneeze game

https://www.miniclip.com/games/sneeze/en/

Plenary - complete one of the sentences below

I was successful when I ……

A question I have about today's lesson is ……

Today I learnt ……

The part of the lesson I enjoyed the most was……

The skills I used in today's lesson were……

One thing I need to remember from today's lesson is……

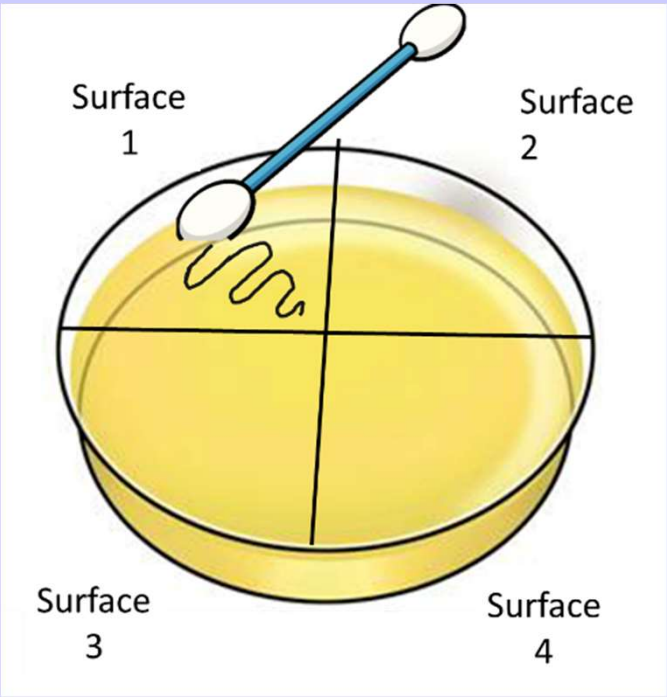
Success Criteria

Spreading Microbes

24/09/2024

Starter:

Complete the Results, Conclusion and Evaluation from the **Growing Microorganisms** experiment and **Growing Microorganisms in the Air** demonstration from last lesson.



Spreading Microbes

24/09/2024

Learning Intentions:

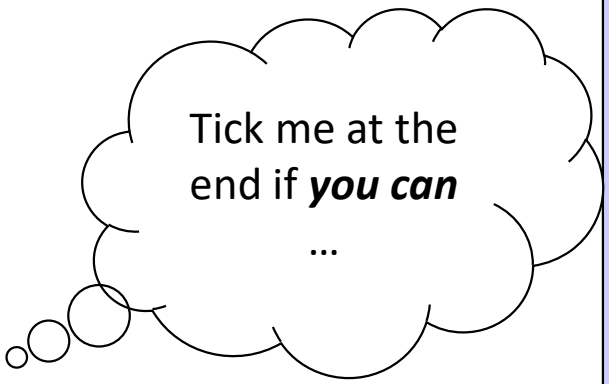
- Use an appropriate technique to grow microbes.
- Explain the importance of hand washing in preventing the spread of microbes.
- Understand the difference between direct and indirect spread of microbes

Spreading Microbes

24/09/2024

Success Criteria

- ❑I can grow microbes on an agar plate
- ❑I can explain the importance of hand hygiene
- ❑I can describe the difference between the direct and indirect spread of microbes



Spreading Microbes Experiment

You have already learned about hand washing…

- The next activity will demonstrate how microbes can be transferred **directly** *or* **indirectly**

Spreading Microbes Experiment

A study in America has shown that during daily activities adults infected with the cold virus transferred it on average to 35 % of the surfaces they touched and that the virus was easily passed to an uninfected individual whose finger tips touched the contaminated surface.

The study also revealed that the most frequently contaminated objects were **door handles** and **pens**, followed by **light switches**, **remote controls** and **taps**.

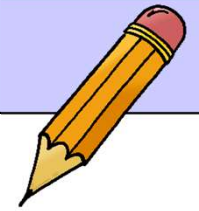
Spreading Microbes Experiment

Aim: To investigate methods of spreading microorganisms.

Method:

There are three options for this experiment. Your teacher will tell you which you are doing.

Spreading Microbes Experiment



Method:

Circle which group you are in

Group A

- The person with the glitter on their hands should shake hands with the first pair of pupils at the start of their line. This pair should go onto shake hands with the next pair in their line. Repeat until they get to the end of the line.

Group B

- The person with the glitter on their hands should handle a ruler and a pencil. The ruler should be passed down one line from pupil to pupil and the pencil down the other until they reach the end of the line.

Group C

- The person with the glitter on their hands should go and wash them using soap and water. Then repeat activity as for group A. Each group should examine their hands and describe what they see.

Spreading Microbes Experiment

Conclusion

- Microbes can be passed from person to person by hand contact. This is called ____Direct_____ spread of microbes.
- Touching contaminated surfaces such as door handles can pass microbes on ____indirect_____ spread of microbes.
- The simplest and most effective way to prevent the spread of microbes is frequent ____Hand washing____.

Word bank:
indirect,
hand washing,
direct

Seven Wonders of the Microbe World

Activity: Watch the video and note down three facts

Be prepared to share!

https://www.youtube.com/watch?v=XuZQUEFD52I

Making Alcohol

24/09/2024

Starter:

1. State the three types of microbes.

2. Name two aseptic techniques.

Making Alcohol

24/09/2024

Learning Intentions:

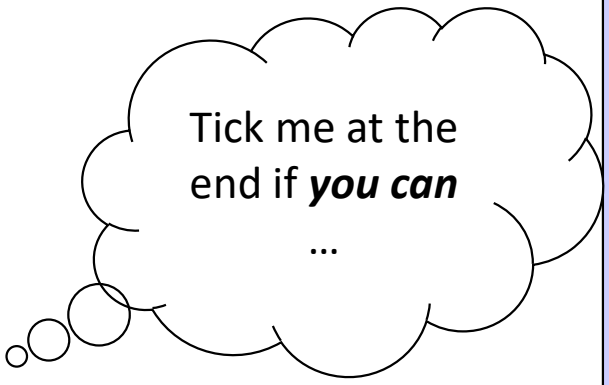
- To state two food products made using yeast
- To carry out a simple fermentation experiment

Making Alcohol

24/09/2024

Success Criteria

- ❑I can state two food products made using yeast
- ❑I can describe a simple fermentation experiment



Making Alcohol

Yeast is a type of _____Fungus_____.

Yeast makes alcohol and
_____Carbon dioxide_____ from _____Sugar_____.

Alcohol makes beer _____alcoholic_____

And carbon dioxide makes beer **fizzy.**

Wine is also made using yeast.
Where does the sugar come from in wine-making?

The process used to make beer is called **fermentation**

Fermentation Equation

Sugar $\xrightarrow{\text{Yeast}}$ Carbon dioxide + ethanol

Fermentation Experiment

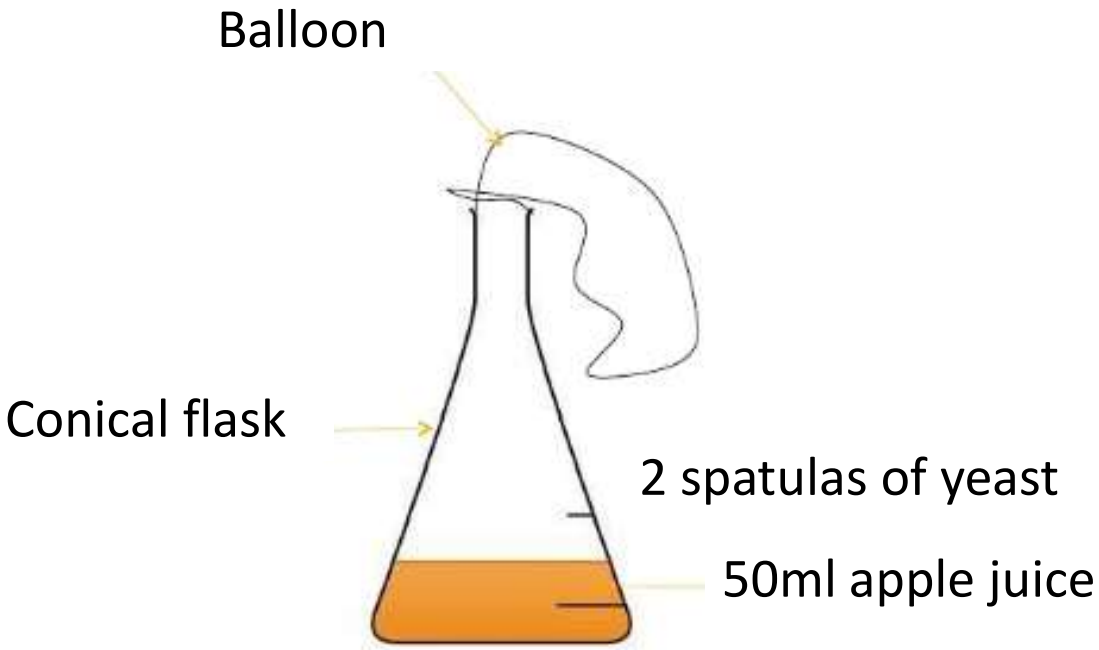
Aim: To investigate if yeast is needed to make alcohol.

Method:

1. Measure 50ml of apple juice and add to a clean conical flask
2. Add 2 spatulas of yeast to the flask and swirl gently until the yeast has dissolved.
3. Carefully, stretch a balloon over the top of the conical flask
4. Your teacher will tell you where to put the conical flask until next lesson.

Fermentation Experiment

Method: *Draw a diagram of your apparatus*

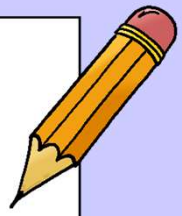


Fermentation Experiment

Results:

Look at your brewing experiment from last lesson.

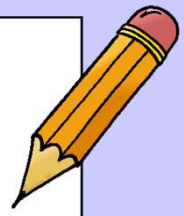
Draw a diagram of what you observed.



Fermentation Experiment

Conclusion:

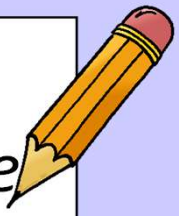
Describe what happened to the balloon and give a reason for this.



Fermentation Experiment

Evaluation:

Yeast is needed to make alcohol. How could we have set up the experiment to prove this?



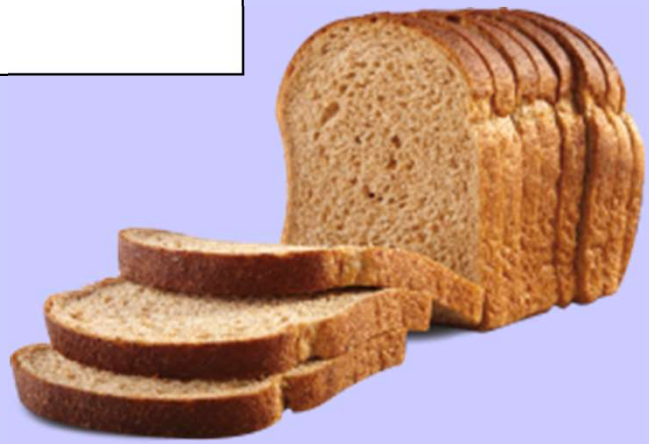
Making Bread

24/09/2024

Starter:

1. Write the fermentation equation.

2. Name two products of fermentation.



Making Bread

24/09/2024

Learning Intentions:

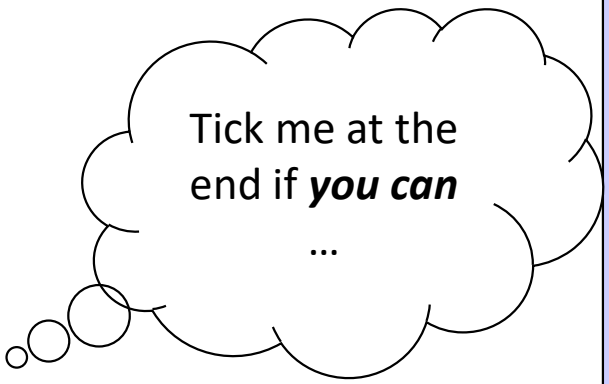
- To state two food products made using yeast
- To carry out a simple fermentation experiment

Making Bread

24/09/2024

Success Criteria

- ❑I can state two food products made using yeast
- ❑I can describe a simple fermentation experiment



Yeast - Bread

Yeast is a type of Fungus.

Yeast feeds on sugar to produce Alcohol and Carbon dioxide.

In bread-making the Carbon dioxide gas is trapped in the bread dough. This makes the dough Rise.

The alcohol evaporates during baking.

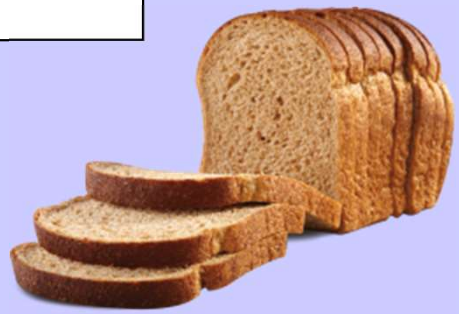
Dough made with yeast

Dough made without yeast

Yeast - Bread

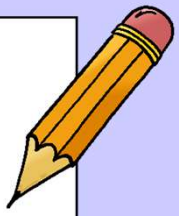
Copy the fermentation equation into the booklet.

$$\text{sugar} \xrightarrow{\text{Yeast}} \text{alcohol} + \text{carbon dioxide}$$



Making Dough

Aim: To investigate if yeast is needed to make dough rise.

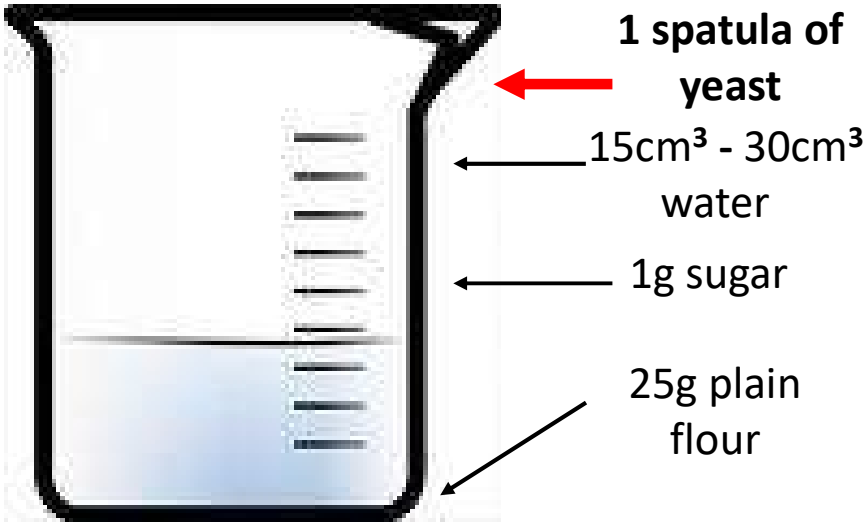


Method:

1. Weigh 25 g flour into the plastic cup and then add 1 g sugar.
2. Add 2 spatulas of yeast
3. Add 15-30 cm3 of water and mix.
4. Draw a line on the cup where the dough reaches – this is the starting line.
5. We will leave the dough overnight to see how well it has risen.

Making Dough

Method: *Draw a diagram of your apparatus*

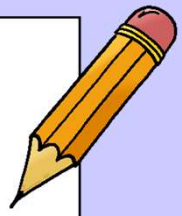


Making Dough

Results:

Look at your dough from last lesson.

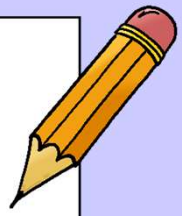
Draw a diagram of what you observed.



Making Dough

Conclusion:

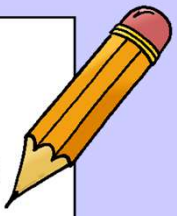
Describe what happened to the dough and give a reason for this.



Making Dough

Evaluation:

Yeast is needed to make dough rise. How could we have set up the experiment to prove this?



Video: Science of Bread making

https://www.youtube.com/watch?v=MvJadSn5t2w

Making Yoghurt

24/09/2024

Page 23

Starter:

1. Name the gas which makes dough rise.

2. What happens to the alcohol in bread when it is baked?

Making Yoghurt

24/09/2024

Learning Intentions:

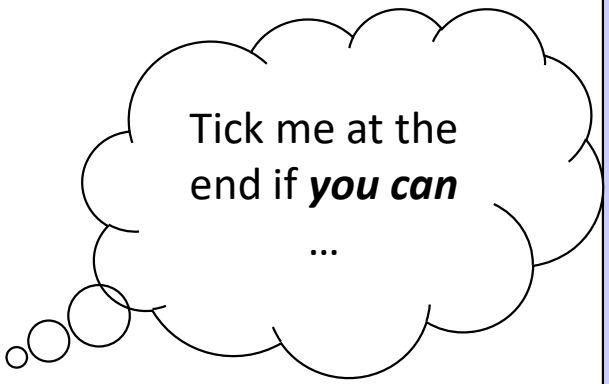
- To state two food products made using bacteria
- To carry out a simple fermentation experiment using bacteria

Making Yoghurt

24/09/2024

Success Criteria

- ❑I can state two food products made using bacteria
- ❑I can describe a simple fermentation experiment



How Yoghurt is Made

- Milk can be changed into cheese and yoghurt.
- This preserves the milk.
- People have done this for hundreds of years.

Making Yoghurt using Bacteria

Yoghurt is made by adding a bacterial _____Culture_____ to ____milk____.

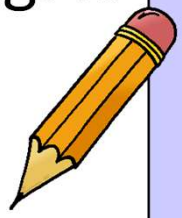
Probiotic products contain billions of _____live_____ bacteria which benefit the digestive system.

The process used to make yoghurt is called **fermentation**

Making Yoghurt using Bacteria

Lactobacillus is a type of ___bacteria___ used in yoghurt making. It changes the milk sugar lactose into lactic acid.

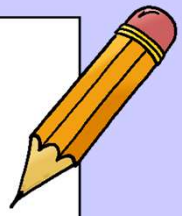
Copy the fermentation equation below into the booklet.



Lactose sugar $\xrightarrow{\text{Bacteria}}$ Lactic Acid

Making Yoghurt

Aim: To investigate the effect of bacteria on the pH of milk.



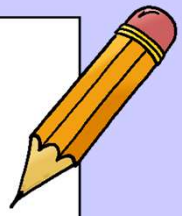
Method:

1. Measure 50mL of _____ into a beaker. Use pH paper to record the starting pH.
2. Stir the milk while heating gently on a tripod over a _____.
3. When it begins to bubble, turn off the gas and leave to cool.
4. Place a _____ into the milk.
5. When the milk has cooled to 35oC, transfer milk to plastic cup, add 3 spatulas of _____ into the cup and stir.
6. Place your mixture into an _____ until next lesson.

milk
Bunsen
thermometer
yoghurt
oven

Making Yoghurt

Results:

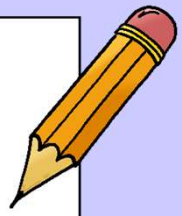


	Colour of pH paper	pH Number	pH: Acid/Alkali/Neutral?
Start			
Final			

Making Yoghurt

Conclusion:

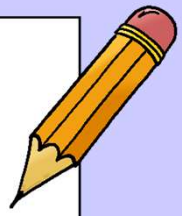
Describe what happened to the pH of the milk.



Making Yoghurt

Evaluation:

Bacteria is needed to make milk thicken into yoghurt. What would we do to make our results more reliable?



Plenary

Before, you leave, answer the following questions:

1. What is the main **raw material** in yoghurt making reaction?

2. What type of **living thing** is needed to carry out the yoghurt making reaction?

3. What is the main **end product** of the yoghurt making reaction?

Making Cheese

24/09/2024

Starter:

Write the word equation for the fermentation for sugar in milk, labelling the raw materials and end products.

Making Cheese

24/09/2024

Learning Intentions:

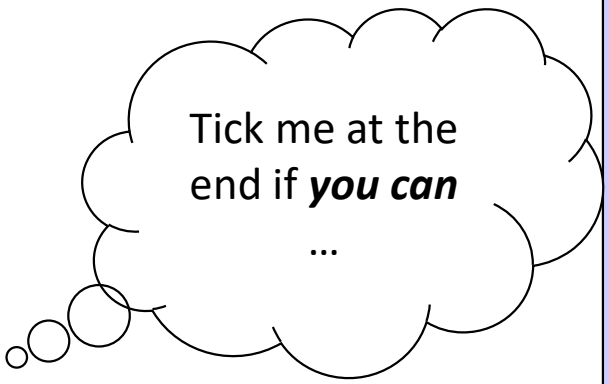
- To state two food products made using bacteria
- To understand how to make cheese

Making Cheese

24/09/2024

Success Criteria

- ❑I can state two food products made using bacteria
- ❑I can understand how to make cheese



Making Cheese

There are two stages in making cheese:

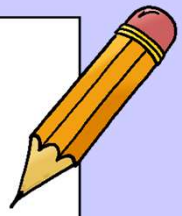
1. Cheese-making bacteria, which feed on the sugar in milk, multiply and produce _acid_. This gives the cheese its flavour and helps the milk to _thicken_.

2. Adding an _enzyme_ called _rennet_ to milk, which makes the milk curdle (clot).

How Cheese is Made

- The liquid whey is then drained off.
- The curd is finally allowed to ripen and mature to form cheese.
- Some cheeses are then flavoured by adding different microbes.

Making Cheese



Aim: To investigate the conditions for making cheese.

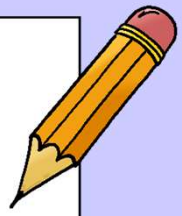
Method:

1. Test your _yoghurt_ from last lesson with pH paper
2. Record the pH in your table from last lesson and write a conclusion
3. Add one drop of _rennet_ to the beaker and stir.
4. This should be covered with clingfilm and left in a _warm_ environment for 24 hours.
5. Your teacher will put the beakers in a fridge if longer than 24 hours.

Making Cheese

Results:

Look at your cheese from last lesson.



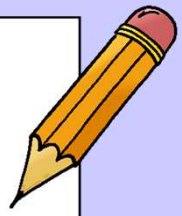
The yoghurt has turned into ___curds___ and ___whey___.

The solid ___curds___ are dried to become ___cheese___

Making Cheese

Conclusion:

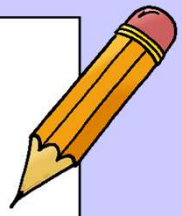
Answer your aim.



Making Cheese

Evaluation:

Rennet is needed to make cheese. How could we have set up the experiment to prove this?



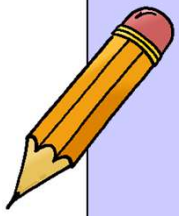
Making Cheese Video

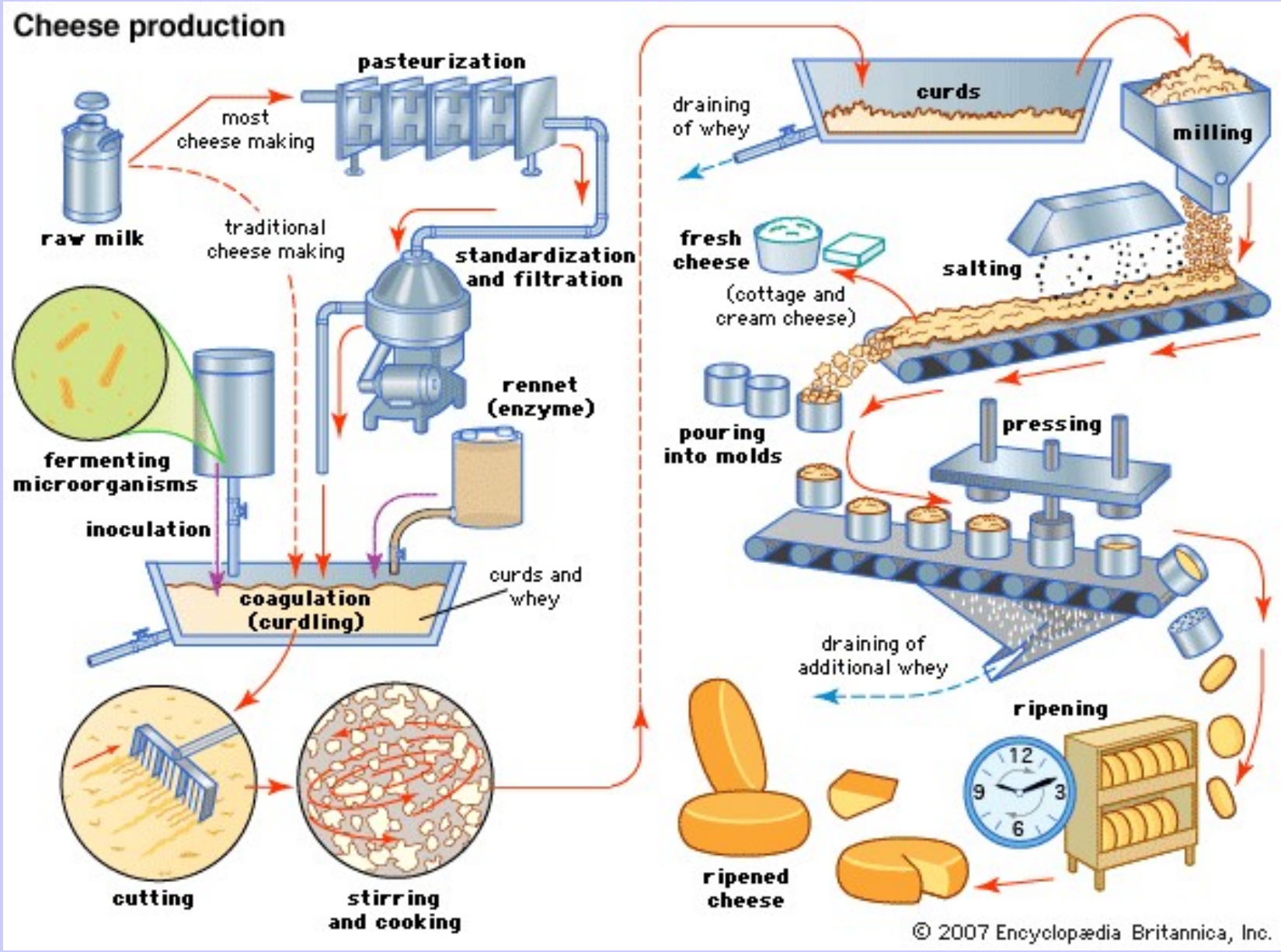
Page 26

British Cheese Board (13 min video)

https://www.youtube.com/watch?v=hXhXTs5uwyg

1. The video shows the production of which type of cheese?
   Cheddar
2. How long does the milk get pasteurised for?
   17 seconds
3. Once the whey is drained off, what is it used for?
   Butter, cream, feed for animals, whey powder
4. What is added to increase the flavour and preserve the cheese?
   Salt
5. The length the cheese is stored for affects what?
   The flavour and colour




Cheese production
pasteurization
most cheese making
raw milk
traditional cheese making
standardization and filtration
rennet (enzyme)
fermenting microorganisms
inoculation
coagulation (curdling)
curds and whey
cutting
stirring and cooking
draining of whey
curds
milling
fresh cheese
(cottage and cream cheese)
salting
pouring into molds
pressing
draining of additional whey
ripening
ripened cheese
© 2007 Encyclopædia Britannica, Inc.

Plenary

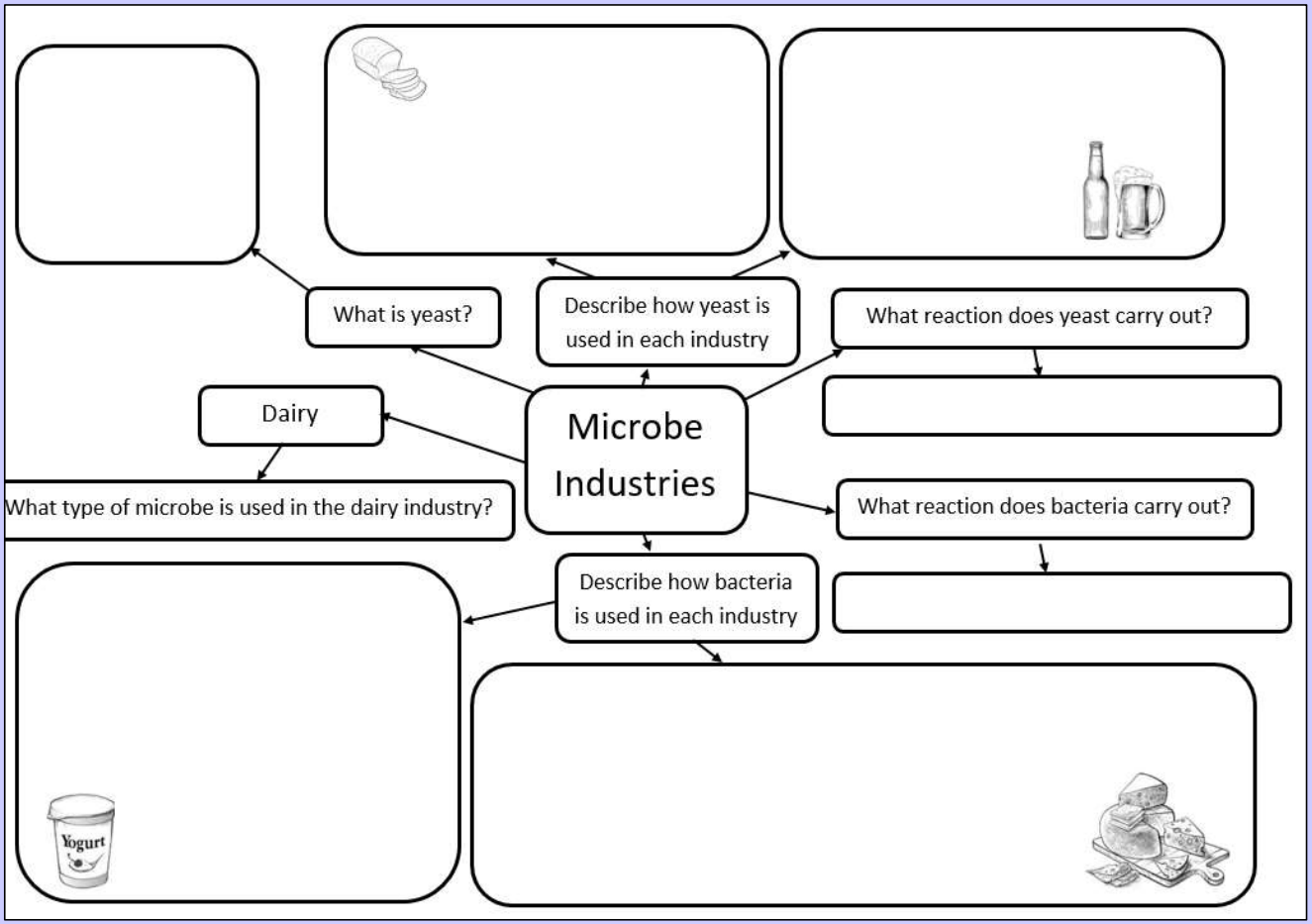
Organise the steps of cheese making into the correct order

Steps in cheese making	**No.**
Curds are pressed into shape to make solid cheeses	7
Milk is heated to kill any unwanted microorganisms	1
Rennet added to clot milk protein	4
Curds and whey are formed	5
Milk is cooled down and cheese making bacteria is added	2
Curds and whey are separated.	6
Bacteria causes milk to thicken as they produce lactic acid.	3

Extension Task

End of Booklet

- Microbes in the Food Industry Mindmap



Microbe Industries

What is yeast?

Yeast is a single celled fungus

Describe how yeast is used in each industry

Yeast is used in baking to ferment sugar. The process makes carbon dioxide which causes dough to rise and alcohol (which evaporates in the oven)

Yeast is used in brewing to ferment sugar. The process makes alcohol and carbon dioxide which makes alcohol fizzy

What reaction does yeast carry out?

fermentation

Sugar (glucose) → alcohol + carbon dioxide

Dairy

What type of microbe is used in the dairy industry?

What reaction does bacteria carry out?

fermentation

Sugar (lactose) → lactic acid

Describe how bacteria is used in each industry

Special bacteria are used to make yoghurt. The bacteria ferment lactose sugar in milk, producing lactic acid. The lactic acid curdles the milk and gives it a sour taste

Special bacteria and an enzyme called rennet are used to make cheese. The bacteria ferment lactose sugar in milk, producing lactic acid. The lactic acid curdles the milk and the rennet helps curdle the milk making solids (curds). Liquid whey is squeezed out to make the cheese more solid

Immune System

24/09/2024

Starter:

1. Where in the body can microorganisms enter?

2. Can you think of anything that stops microbes from getting in?

Immune System

24/09/2024

Learning Intentions:

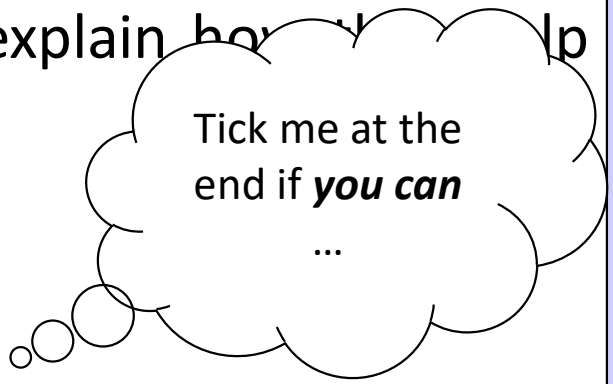
- To describe the role of the immune system
- To investigate the different ways that the body defends itself from microbes

Immune System

24/09/2024

Success Criteria

- ❑I can state that the first-lines of defence are the body's natural barriers.
- ❑I can explain how the first-lines of defence can prevent the entry of pathogens.
- ❑I can list different types of white blood cells and explain how they help defend the body against disease.



Defending Ourselves Against Microbes

Most pathogens have to get inside our body to spread infection.

Once they are in, the body provides ideal living conditions such as plenty of food, water and warmth.

However, our bodies have many ways of **stopping bacteria and viruses from getting in**.

Defending Ourselves Against Microbes

The body's defences:

Prevent _____ microbes getting into the body

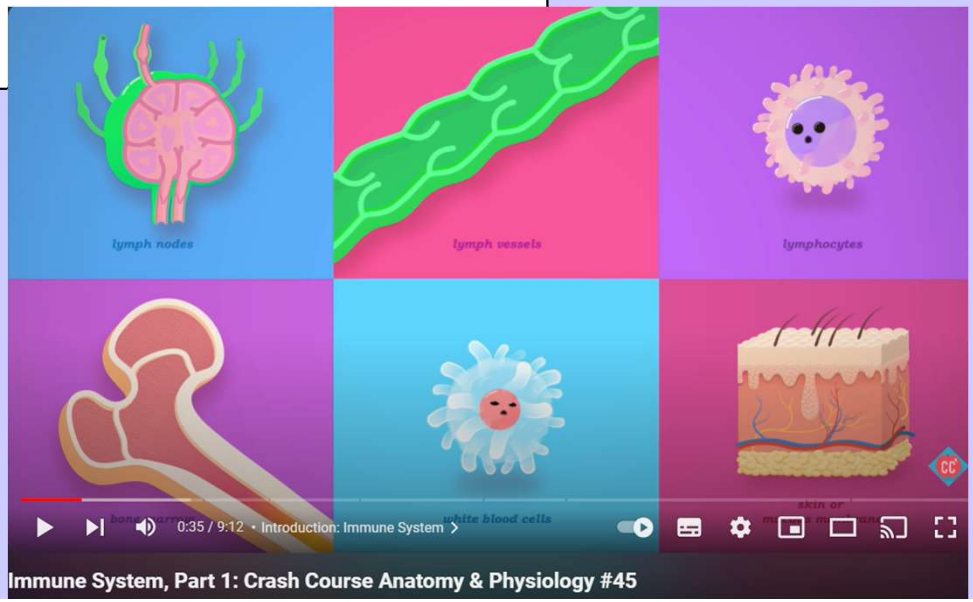
Destroy _____ microbes once they have got in

The first-line of defence

The first line of defence preventing _pathogens_ from entering are the body's _Natural barriers_.

These can be **physical** or **chemical** barriers.

Watch to 3.18



saliva - Contain an anti-bacterial substance

Tears - contain an anti-bacterial substance

Mucus - in the air passages traps bacteria.

Cilia - in the air passages sweep the dirty mucus towards nose and throat.

skin – surface is impermeable to some microbes

Harmless bacteria – competes with harmful bacteria in large intestine

Stomach acid

At pH2 it can kill some microbes

What happens when the first-line defences fail?

If a harmful microbe gets past one of these defences we may become infected and suffer from a disease.

However, sometimes we don't suffer the disease even if a disease causing microbe (**a pathogen**) infects our body.

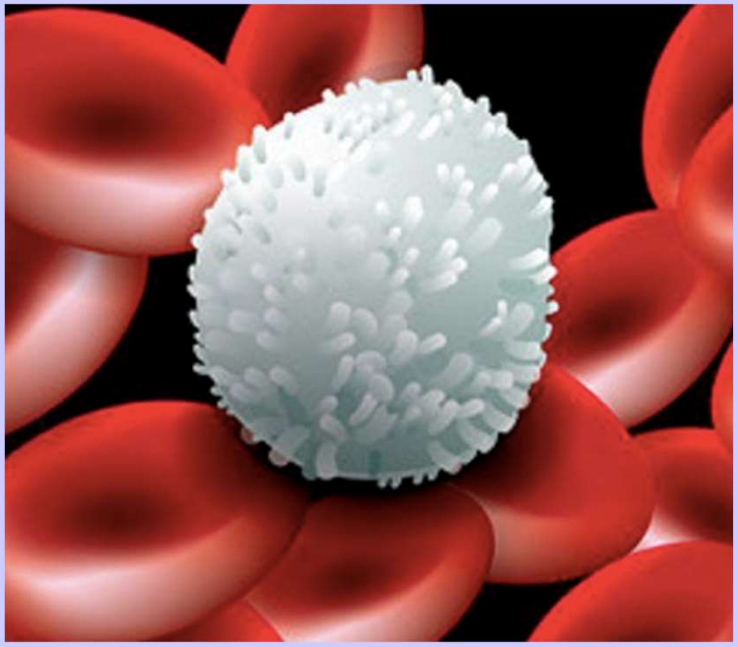
Can you think why this is?

Immune system

If we do get ill our **immune system** is able to kill off the bacteria or viruses. We may feel ill for a while.

There are **special cells** in our **blood** which are able to get rid of bacteria and viruses.

What are these cells called?

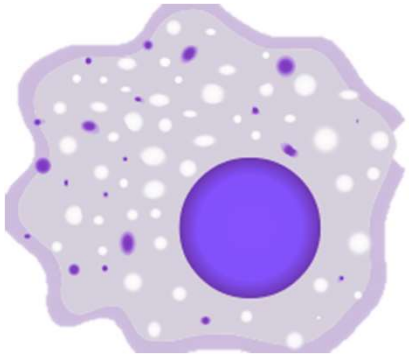


White blood cell

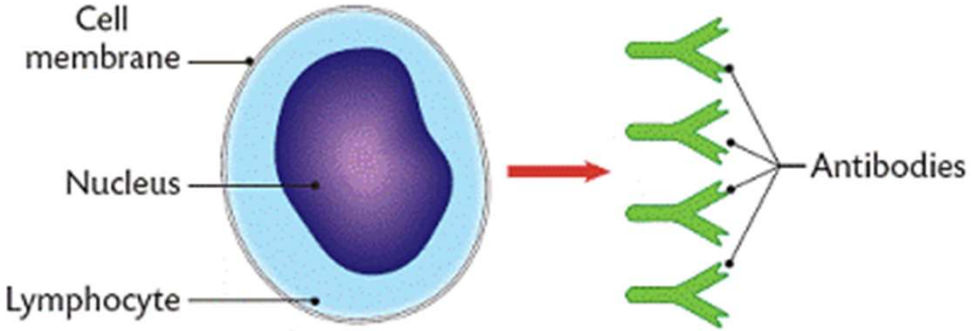
White blood cells

There are two main groups of white blood cells which are involved in the immune system:

1. Phagocytes
– engulf bacteria

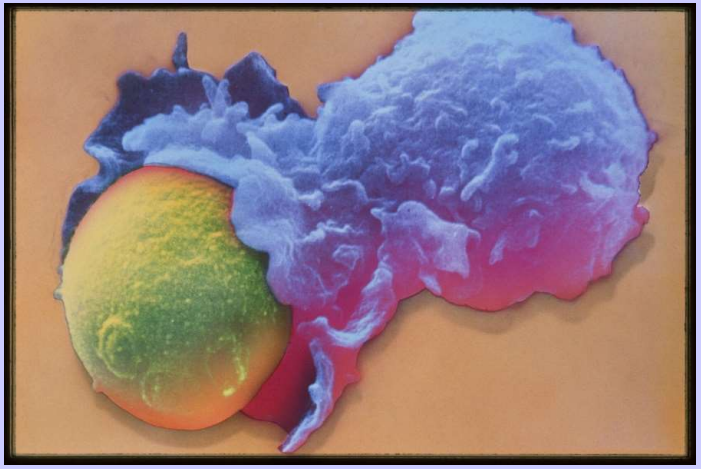


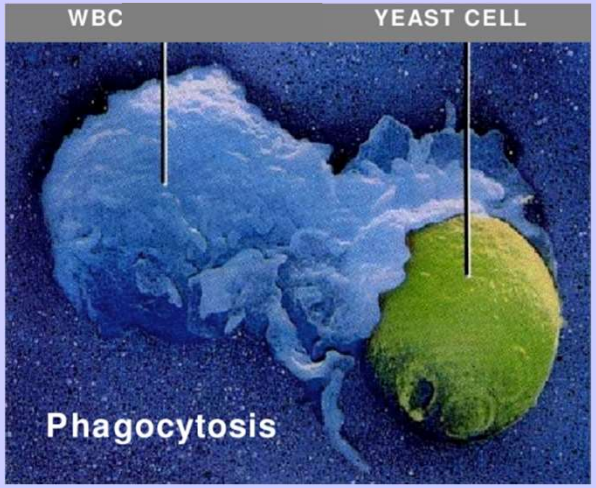
2. Lymphocytes
– produce antibodies



Phagocytes

1. Special white blood cells patrol the blood and tissues and they are attracted to foreign microbes by a chemical.
2. They move towards the microbe and engulf (eat) it.
   This is called **PHAGOCYTOSIS**.

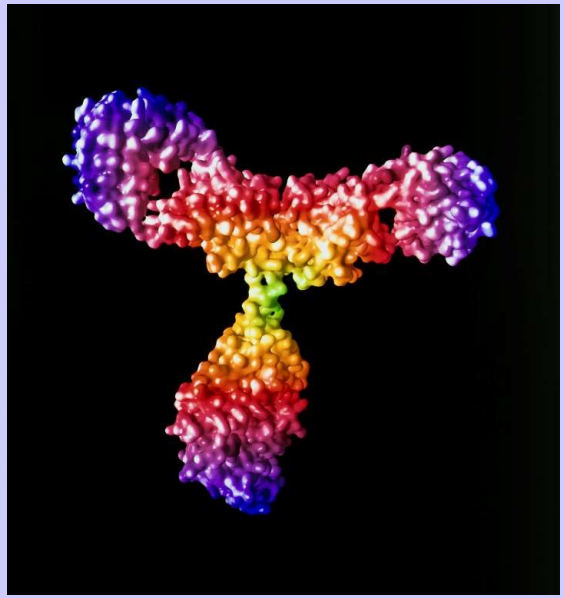




Lymphocytes

Lymphocytes make antibodies

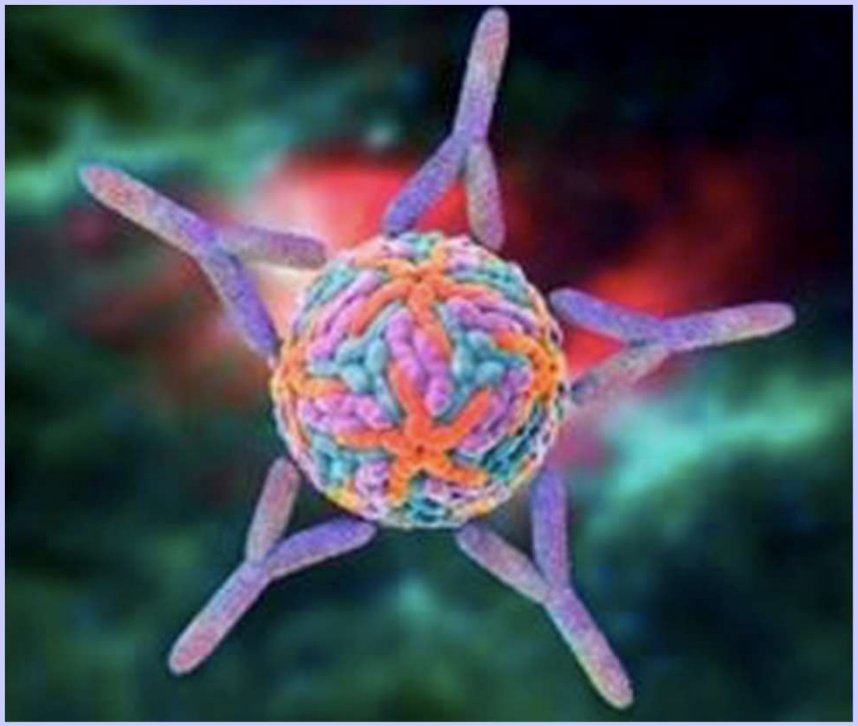
- An antibody is a Y-shaped protein that is produced by lymphocytes (type of white blood cell) in response to the presence of a pathogen



Antibody

Antibodies

- The antibodies attaching to the microbes make them clump together and prevents them from invading anymore cells.
- It also makes it easier for other white blood cells to engulf the microbe.



Sustainable Development Goals

Numeracy Extension Task – part 1

- **Coverage of the required three doses of the vaccine that prevents diphtheria, tetanus and pertussis increased from 72 per cent in 2000 to 85 per cent in 2015 and has remained unchanged between 2015 and 2017.**
- An estimated 19.9 million children did not receive the vaccines during the first year of life, putting them at serious risk of these potentially fatal diseases. The estimated number of children in the whole world is 1.9 billion
- Two doses of the measles vaccine are required to prevent the disease and the illnesses, disabilities and deaths caused by complications associated with it. Coverage with the second dose of measles vaccine increased from 59 per cent in 2015 to 67 per cent in 2017, but that is still insufficient to prevent this highly contagious disease.
- https://sustainabledevelopment.un.org/sdg3

Sustainable Development Goals

Numeracy Extension Task – part 1

- **“Coverage of the required three doses of the vaccine that prevents diphtheria, tetanus and pertussis increased from 72 per cent in 2000 to 85 per cent in 2015 and has remained unchanged between 2015 and 2017. “**

1. Make a table using the information above
2. Label one column “Year” and the other “Percentage coverage of vaccine (%)”
3. Fill in information for each of the years 2000,2015,2017

Sustainable Development Goals

Numeracy Extension Task – part 1

- **“Coverage of the required three doses of the vaccine that prevents diphtheria, tetanus and pertussis increased from 72 per cent in 2000 to 85 per cent in 2015 and has remained unchanged between 2015 and 2017. “**

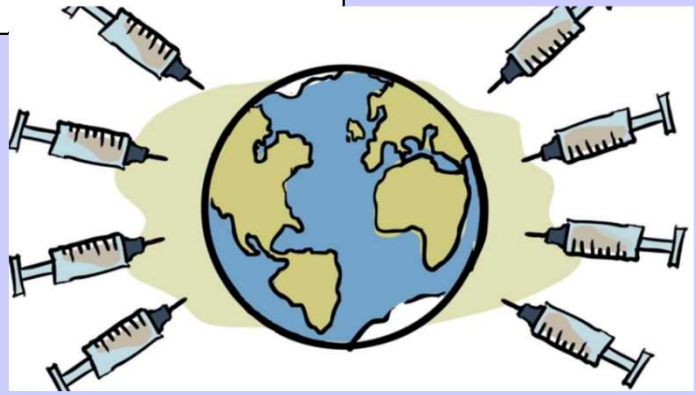
Year	Percentage coverage of vaccine (%)
2000	72
2015	85
2017	85

Immunity and Vaccinations

24/09/2024

Starter:

Can you remember any vaccinations you've had?



Immunity and Vaccinations

24/09/2024

Learning Intentions:

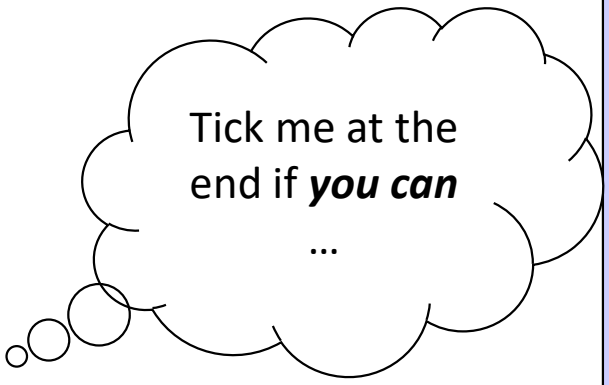
- To describe the development of vaccinations and their importance in preventing diseases

Immunity and Vaccinations

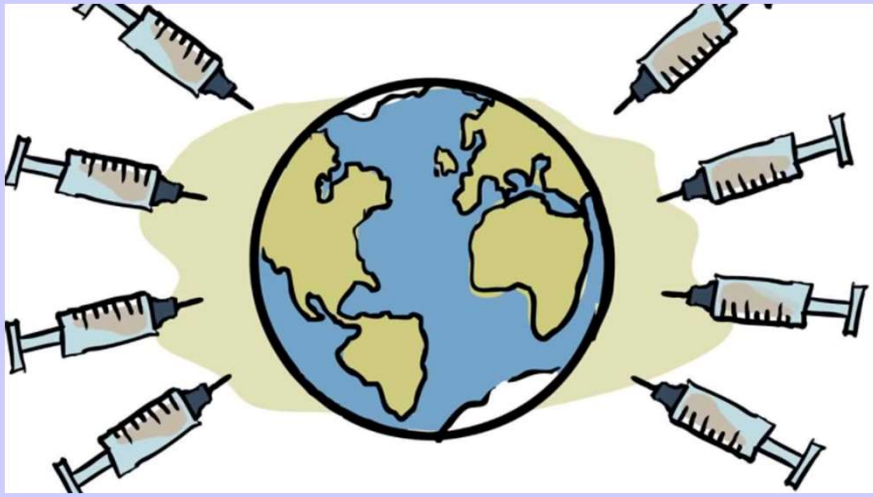
24/09/2024

Success Criteria

- ❑ I can state that vaccines are used to prevent diseases.
- ❑I can explain how the first vaccine was developed.
- ❑I can explain how vaccinations result in immunity.



Vaccinations



The following link shows a list of routine vaccinations offered in the UK.

Immunity

Page 29

Immunity is when your body is able to resist a __Disease___ or infection.

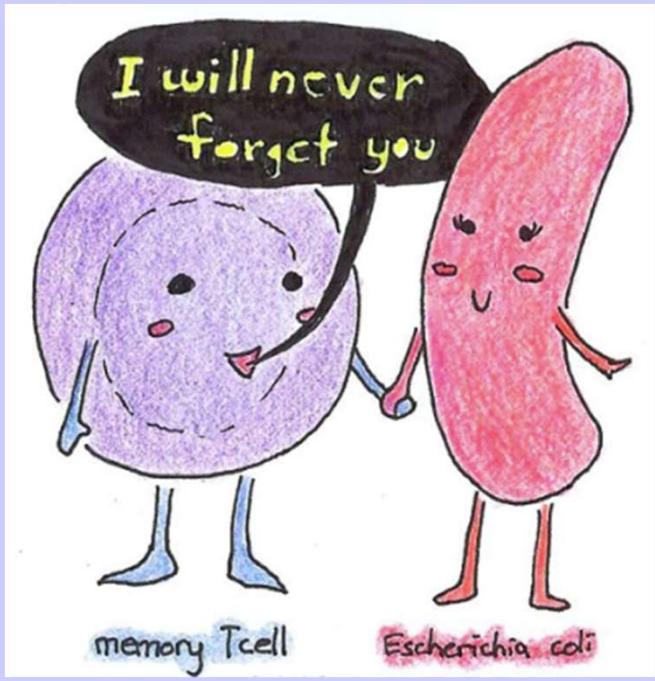
Immunity results from either being exposed to the disease before or by ___vaccination___.

Immunity

With some infections, like Chicken Pox, white blood cells fight the infection by producing antibodies which join with the virus and make the virus safe by inactivating it.

When the virus has been inactivated, **special memory cells** remember the virus and inactivate it if you encounter the virus again.

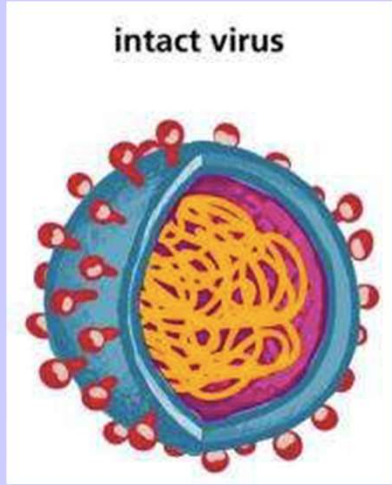
This is called **immunity**.

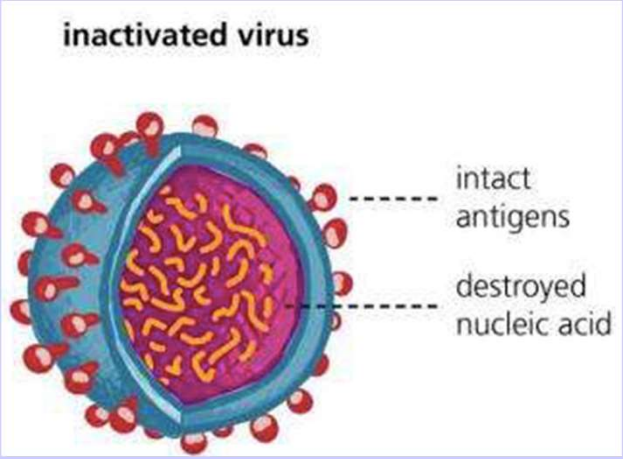


What is a vaccine?

A vaccine contains a **dead** or weakened form of an infectious microbe.

This dead or weakened microbe can’t multiply inside or bodies so does not cause us any real harm.



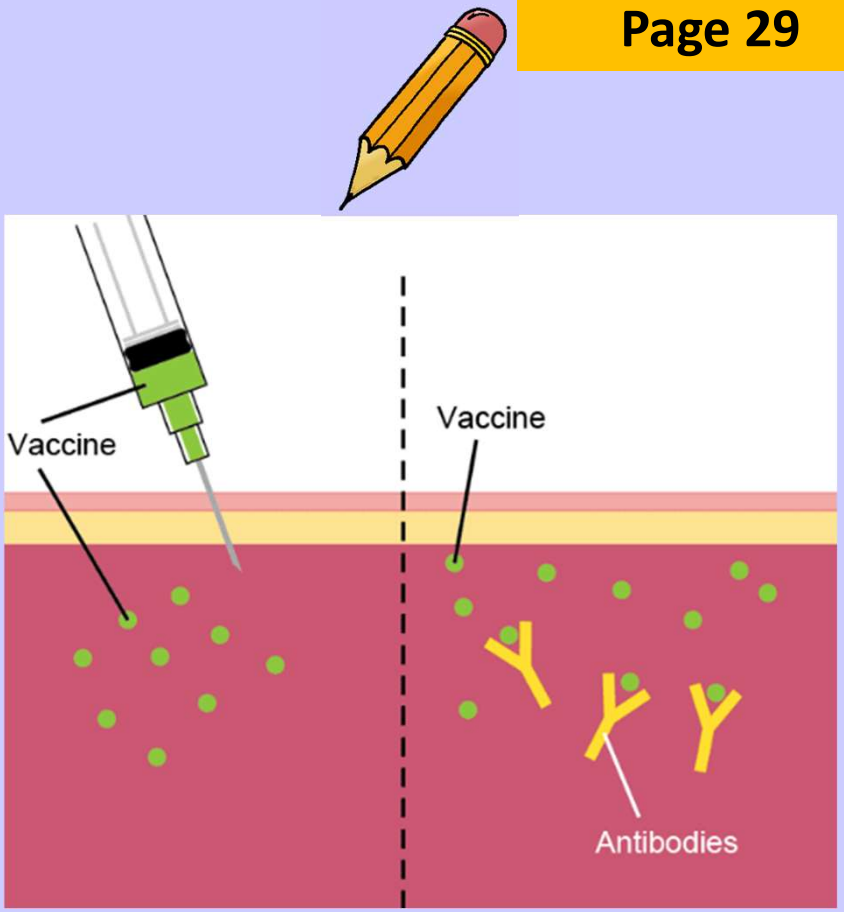


What is a vaccine?

We are injected with a __safe__ or dead form of a disease causing __microbe__.

Our body thinks the microbe is real and makes __antibodies__ against it.

If the person becomes infected for real the __immune__ system acts more __quickly__ because it already has antibodies.

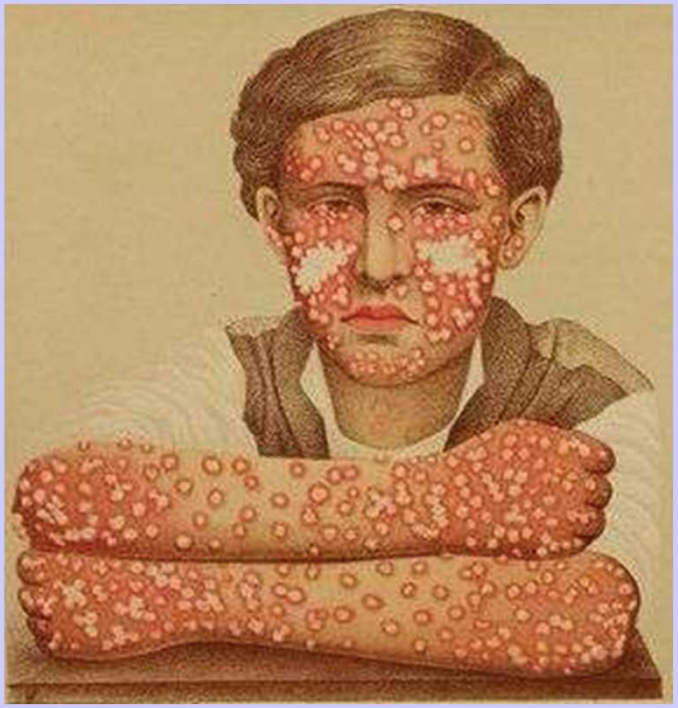


Smallpox

Many years ago, there was a disease called **smallpox**.

Symptoms included fever, chills, headache, nausea, vomiting, severe muscle ache and a severe rash.

30-50% of people that contracted the virus died.



Smallpox

Activity: Watch the Smallpox video and note down three facts

Smallpox virus video

How were vaccines discovered?

https://www.youtube.com/watch?v=sJRJeOxX6no

Edward Jenner was a scientist that lived in the 18th Century.

He discovered the first vaccine, which was for the **smallpox virus**.

This disease was widespread in the 18th century and killed many people.

How were vaccines discovered?

People living in the countryside noticed that milkmaids never seemed to catch small pox.

This was because they were subjected to another similar infection caught from the cows they milked - **cowpox**.

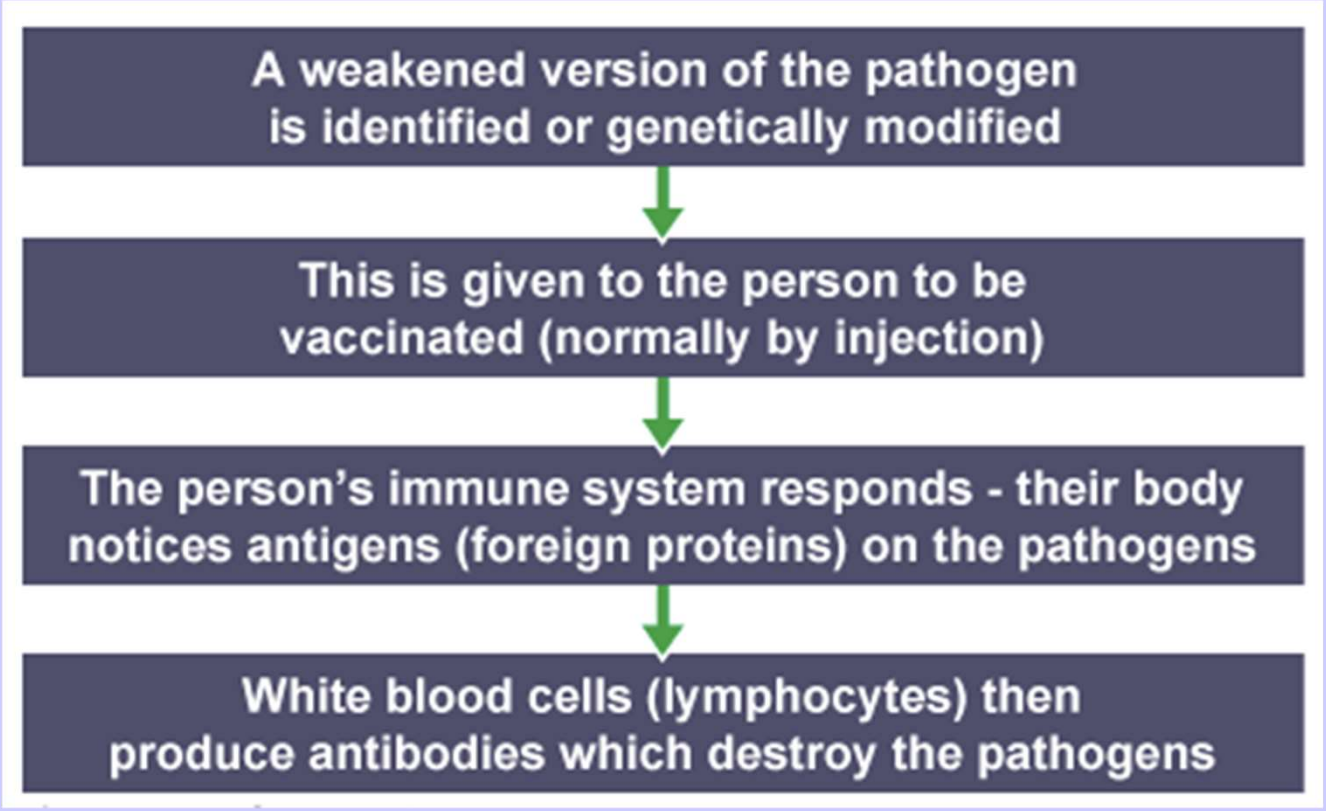
How were vaccines discovered?

Edward Jenner collected **pus** from the cowpox blisters on a milkmaid's hands and infected an 8 year old boy, James Phipps.

The boy was ill for a while but was then **resistant** to infections of the cowpox and smallpox viruses.

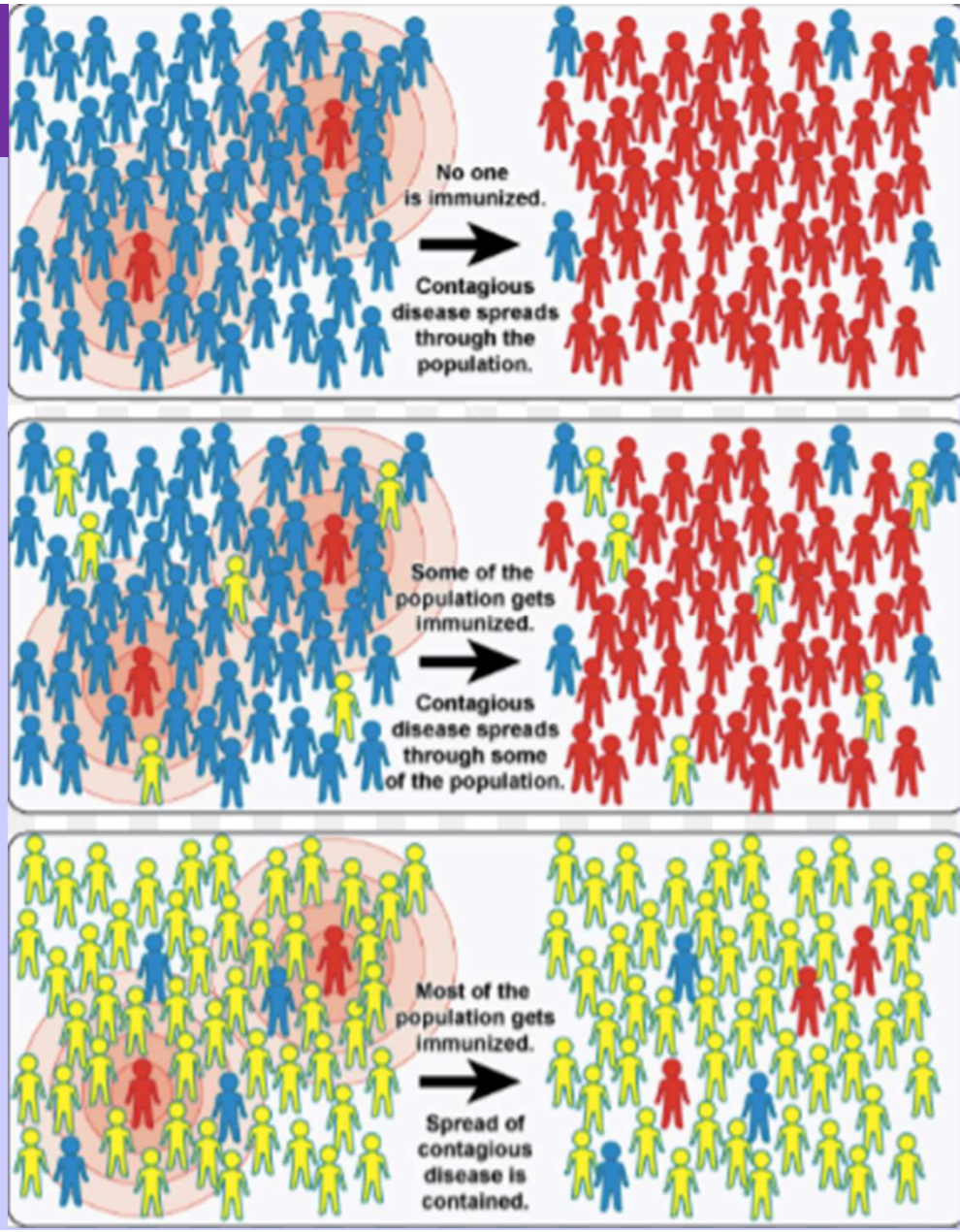
He tested this immunity by infecting the boy with smallpox. No illness occurred.

How do vaccinations work?



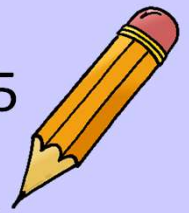
Immunity

Watch the animation to see how vaccinations can result in a population becoming immune to a disease.



Sustainable Development Goals

Numeracy Extension Task part 2



- Coverage of the required three doses of the vaccine that prevents diphtheria, tetanus and pertussis increased from 72 per cent in 2000 to 85 per cent in 2015 and has remained unchanged between 2015 and 2017.
- **An estimated 19.9 million children did not receive the vaccines during the first year of life, putting them at serious risk of these potentially fatal diseases. The estimated number of children in the whole world is 1.9 billion**
- Two doses of the measles vaccine are required to prevent the disease and the illnesses, disabilities and deaths caused by complications associated with it. Coverage with the second dose of measles vaccine increased from 59 per cent in 2015 to 67 per cent in 2017, but that is still insufficient to prevent this highly contagious disease.
- https://sustainabledevelopment.un.org/sdg3

Sustainable Development Goals

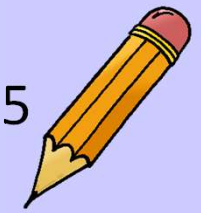
Numeracy Extension Task part 2

“An estimated 19.9 million children did not receive the vaccines during the first year of life, putting them at serious risk of these potentially fatal diseases. The estimated number of children in the whole world is 1.9 billion”

1. Using the information above, work out how many children in the whole world have been vaccinated during the first year of life
2. Challenge yourself: work out the percentage of children in the world that have been vaccinated

Sustainable Development Goals

Numeracy Extension Task part 3



- Coverage of the required three doses of the vaccine that prevents diphtheria, tetanus and pertussis increased from 72 per cent in 2000 to 85 per cent in 2015 and has remained unchanged between 2015 and 2017.
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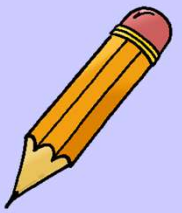
Sustainable Development Goals

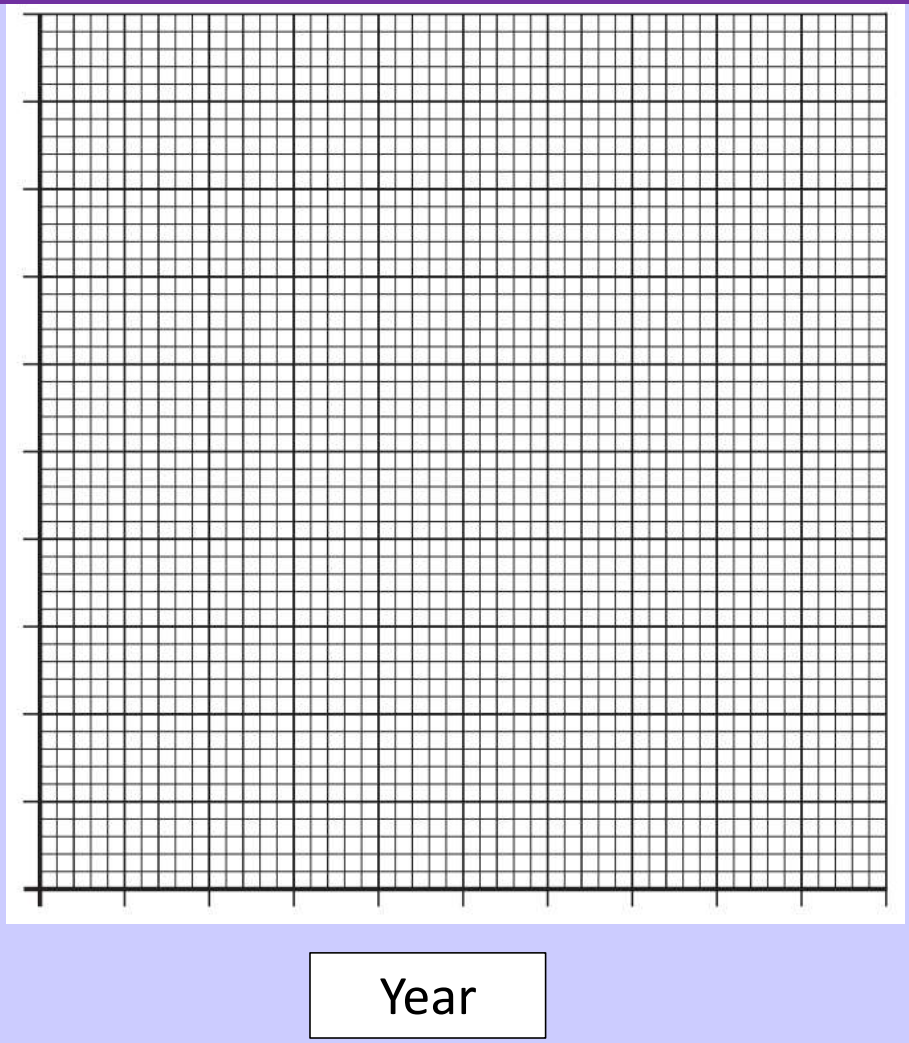
Numeracy Extension Task part 3

- **“Two doses of the measles vaccine are required to prevent the disease and the illnesses, disabilities and deaths caused by complications associated with it. Coverage with the second dose of measles vaccine increased from 59 per cent in 2015 to 67 per cent in 2017, but that is still insufficient to prevent this highly contagious disease.”**
- Make a bar graph using the information above
    1. Label the x-axis “Year”
    2. Label the y-axis “Percentage coverage of vaccine (%)
    3. Make a bar for each of the years 2000,2015,2017

Sustainable Development Goals

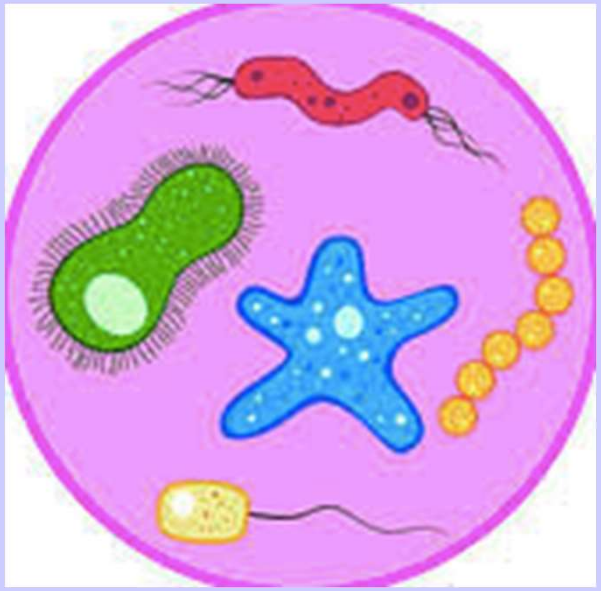
Numeracy Extension Task part 3





Microbes and Health

Watch the Scientific Eye video about ‘Microbes and health’



Take brief notes about:

- the diseases mentioned
- what causes them
- the treatments
- how to prevent the disease

Extension Task - Storyboard

Create a storyboard of Edward Jenner and his discovery of the first Smallpox vaccine.