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 ……

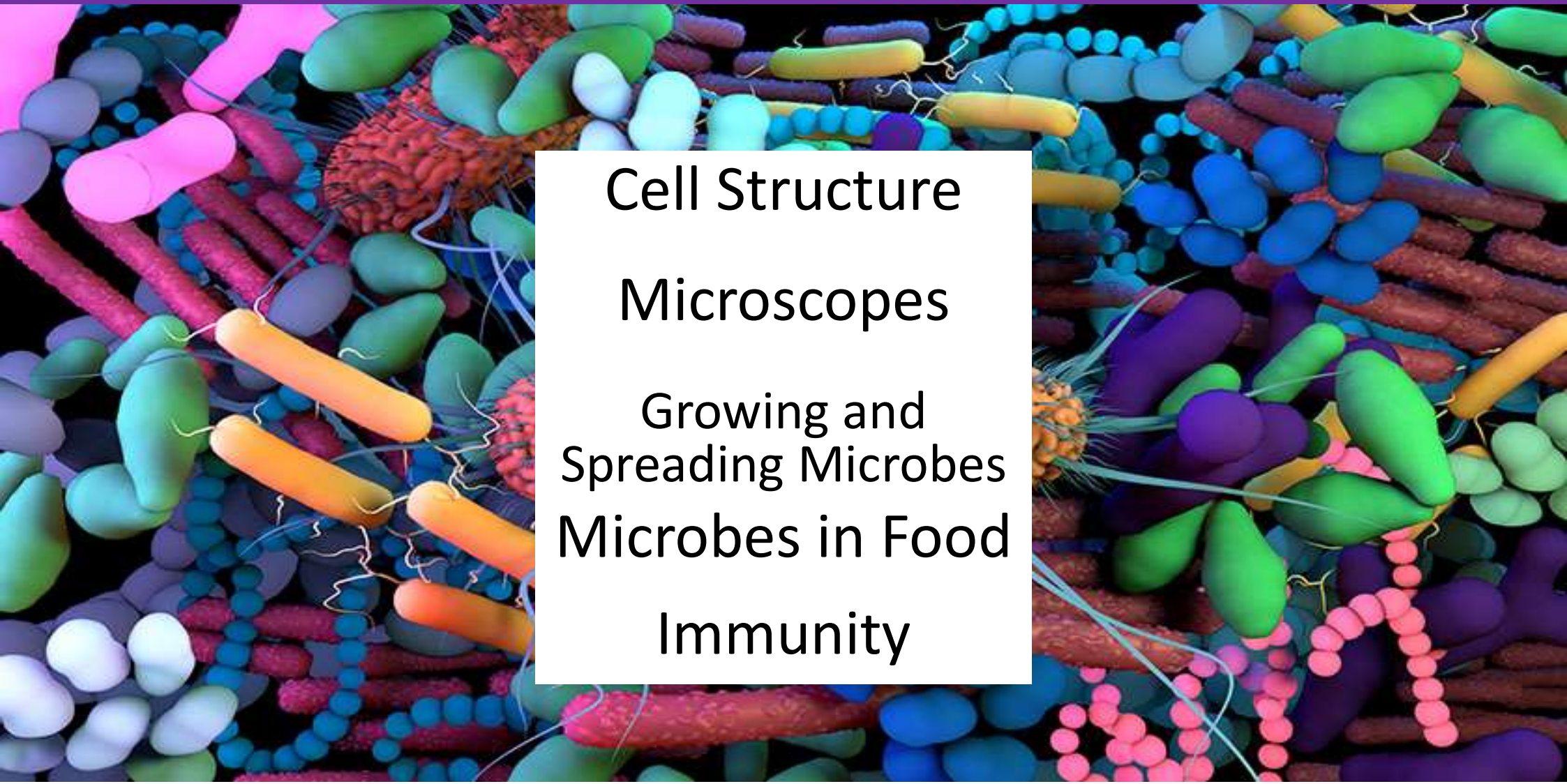
The part of the lesson I enjoyed the most was……

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

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

Success Criteria

S1 Science - Cells



Cell Structure

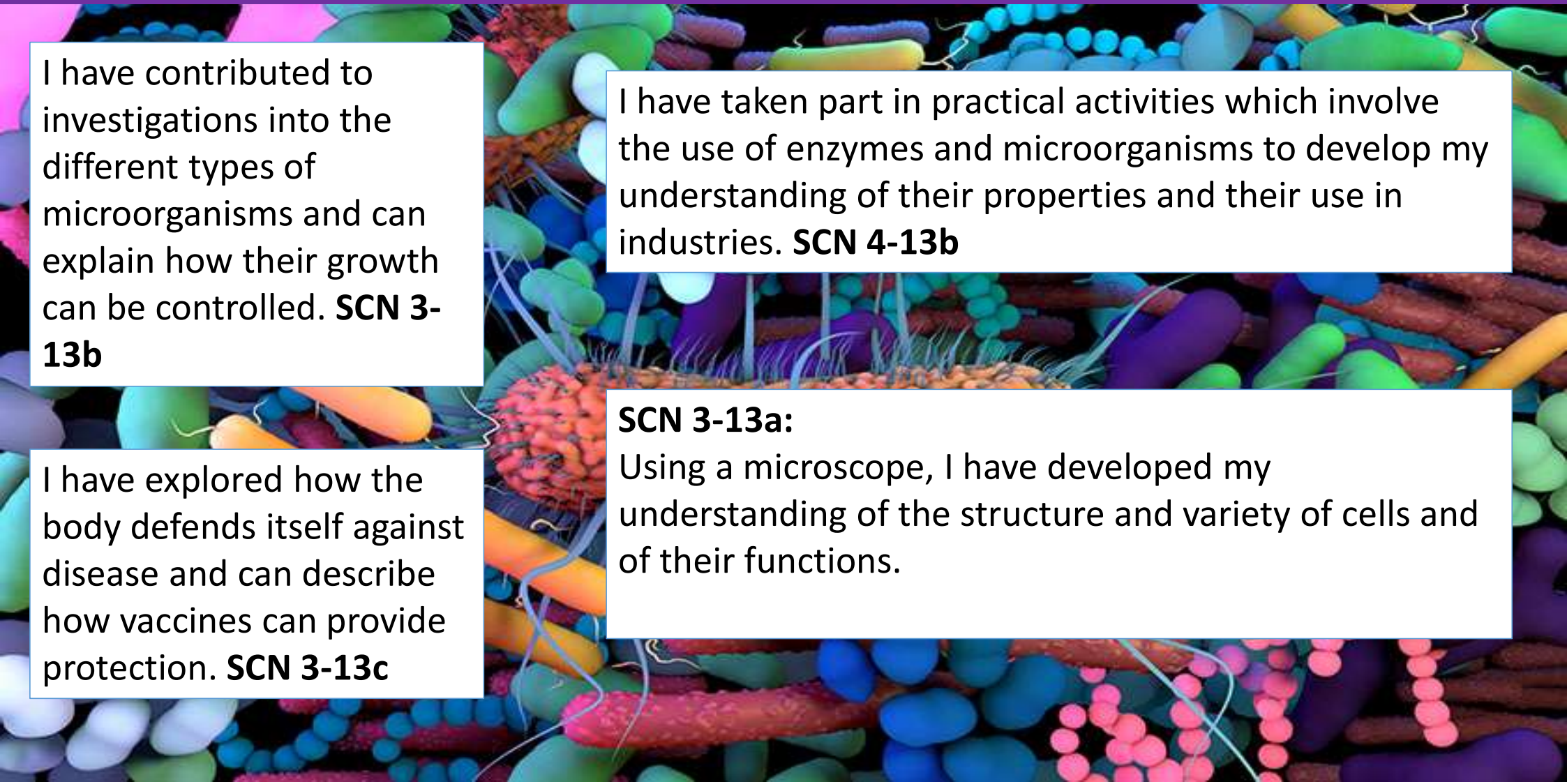
Microscopes

Growing and Spreading Microbes

Microbes in Food

Immunity

S1 Science - Cells



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**

SCN 3-13a:
Using a microscope, I have developed my understanding of the structure and variety of cells and of their functions.

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

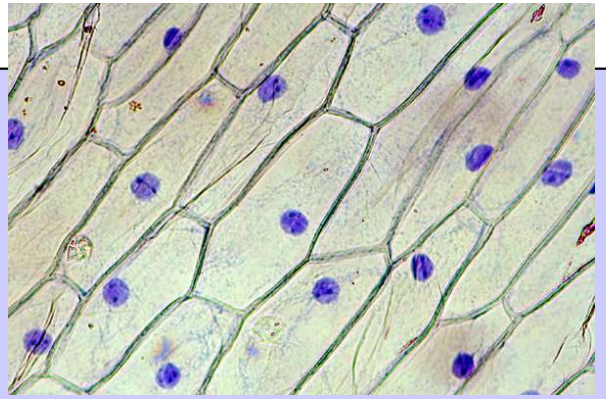
Cells

24/09/2024

Starter:

1. Write down 3 things you think we might be learning about in this topic.

2. What comes to mind when you think of the word ‘cell’?



Cells

24/09/2024

Learning Intentions:

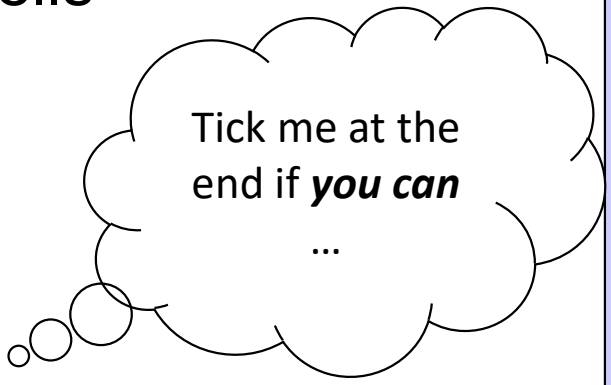
- I am learning about the cells and their structures.

Cells

24/09/2024

Success Criteria

- ❑I can state the main types of cells in the body
- ❑I can describe the function of different types of cells

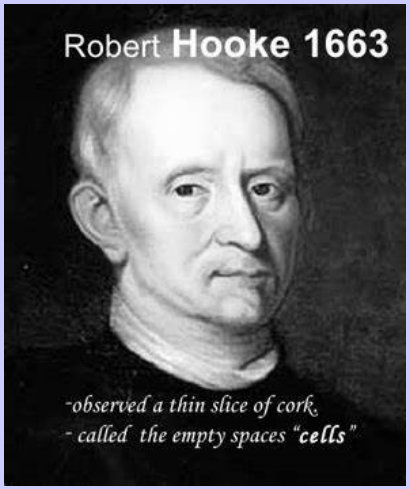


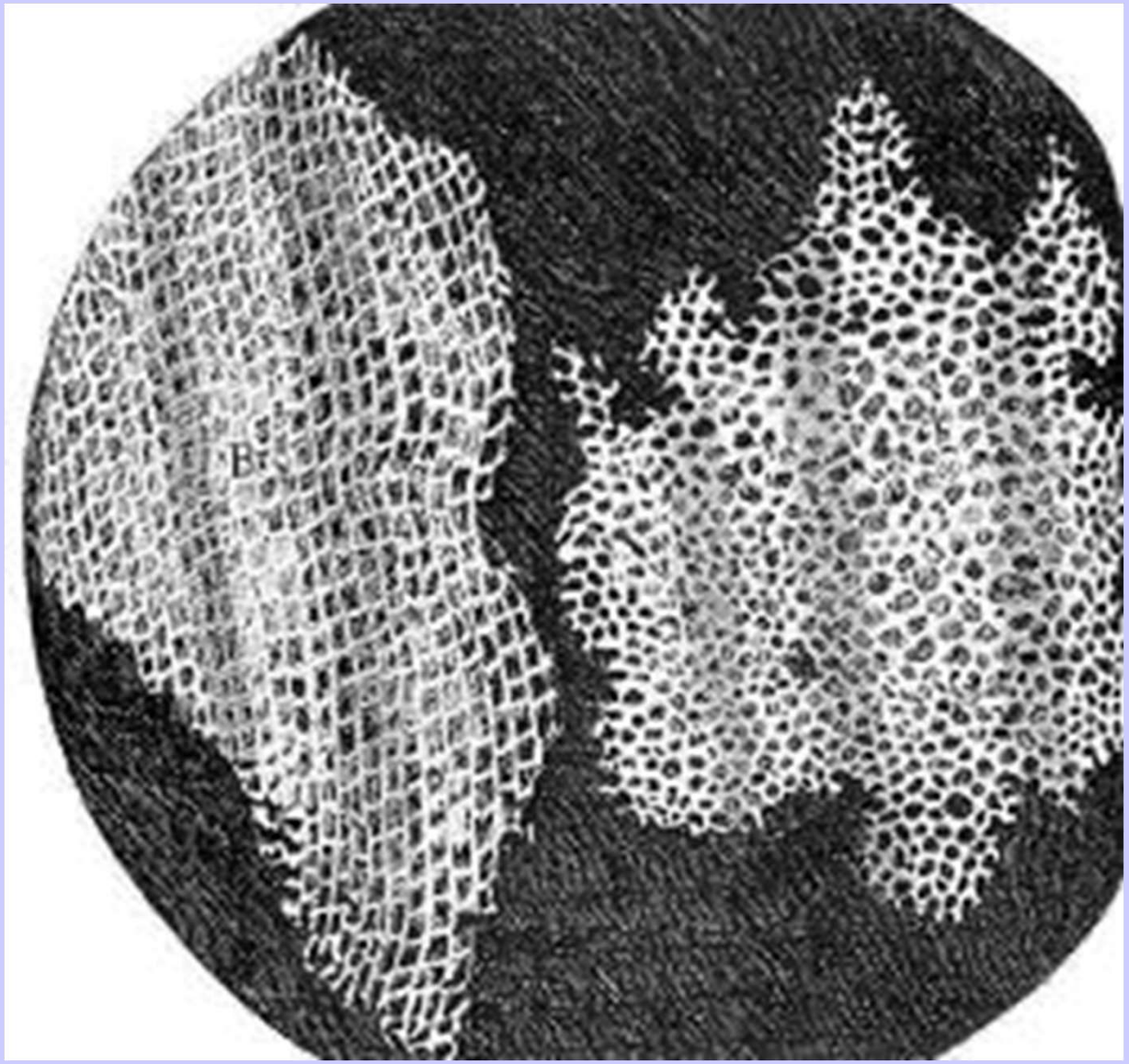
Cells

- Life on our planet would exist only as microbes and other very small organisms if bodies could not be assembled or grow using cells.
- Cells are the building blocks of life.
- Your body is made up of about 37.2 TRILLION of them.

Cells

- Cells got their name when Robert Hooke discovered them in the year 1663.
- For his experiment he cut very thin slices from cork. He looked at these slices under a microscope.
- He saw tiny box-like shapes which reminded him of the plain small rooms that monks lived in called "cells".



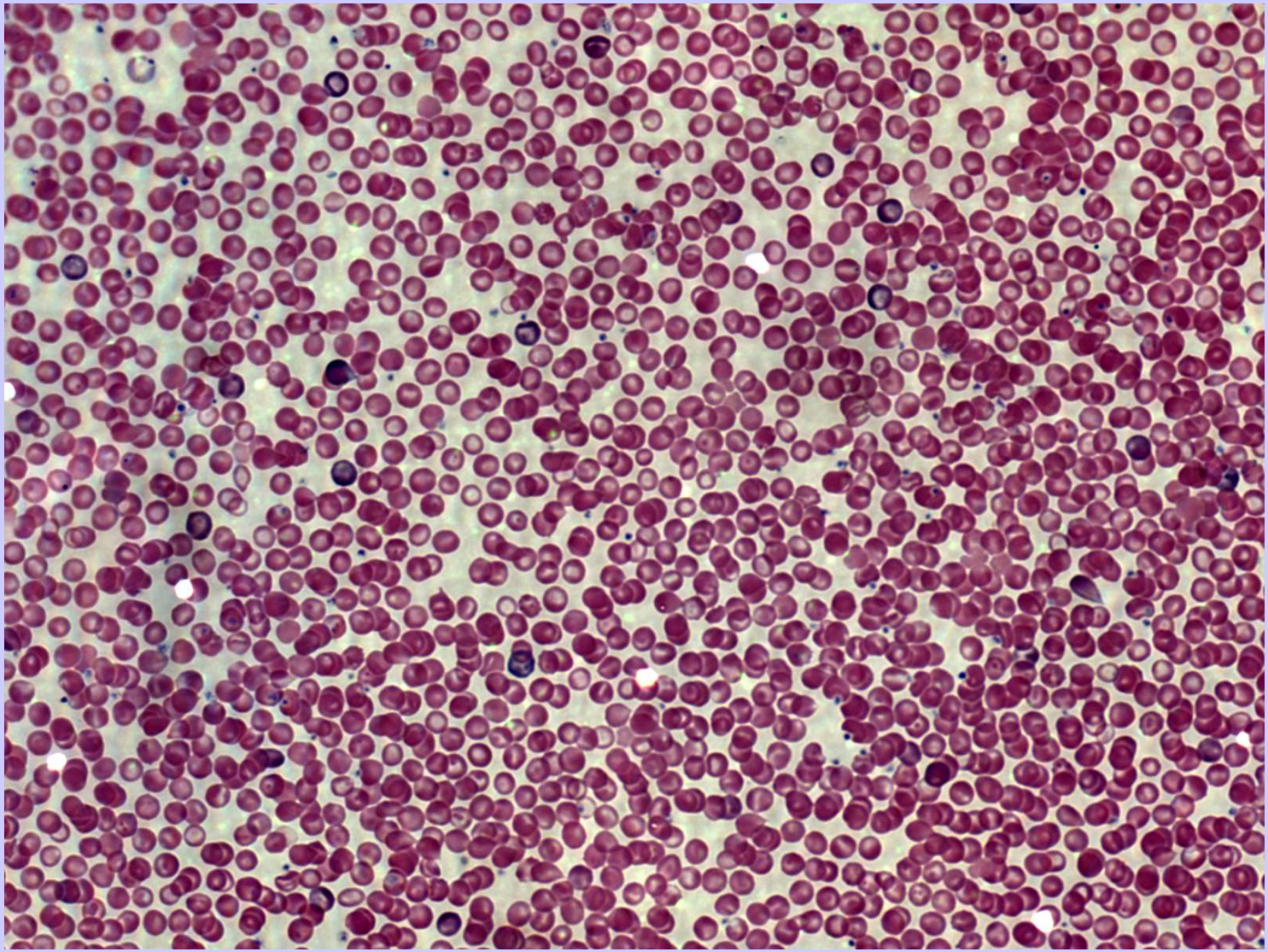


Cells

- Since Robert Hooke, biologists have been fascinated by cells and their many functions.
- The next few slides show some images of different cells seen through a microscope.

These tiny red cells are your **red blood cells.**

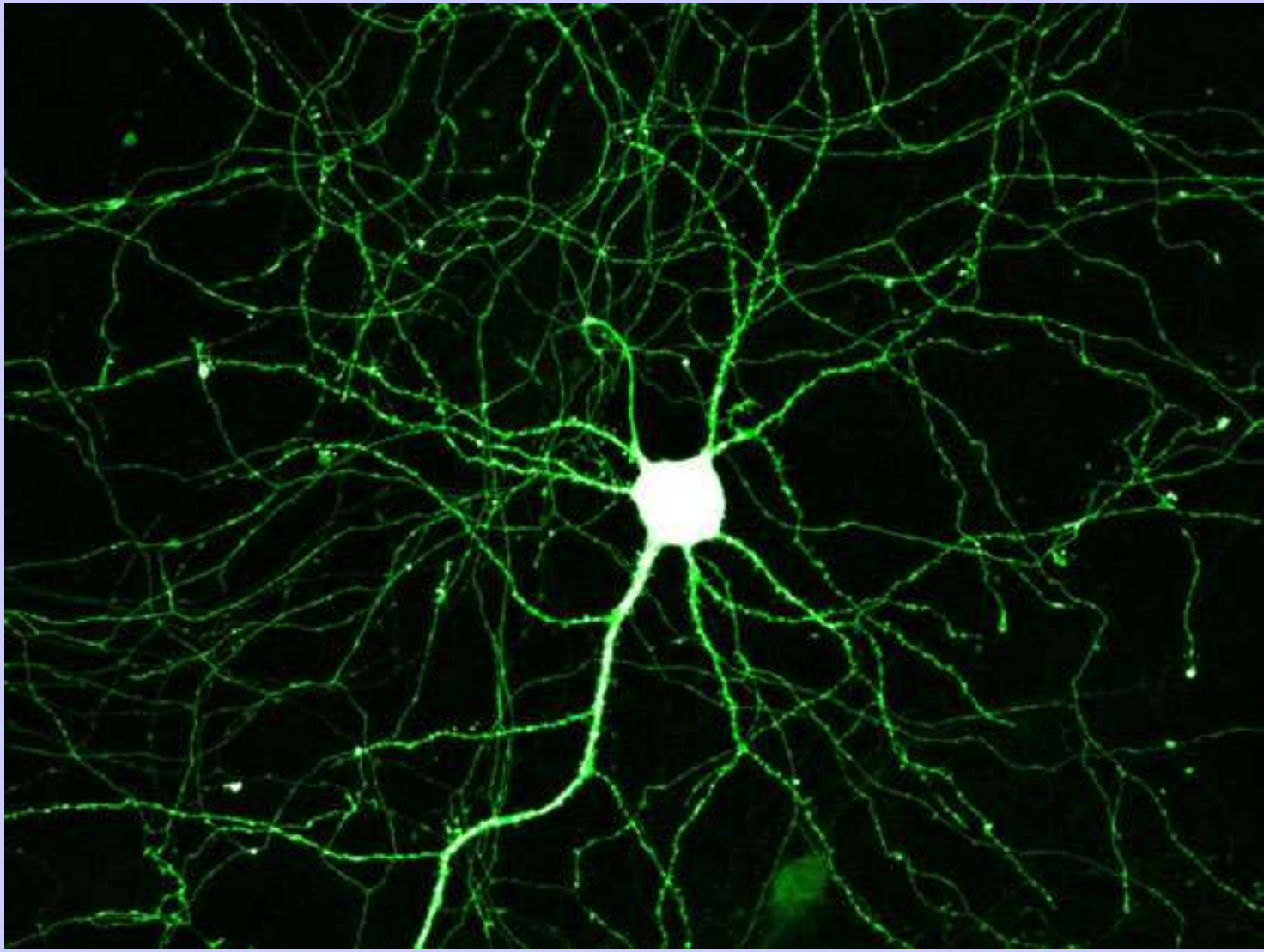
Their job is to carry oxygen all around your body.



This spider-like cell is called a **neuron** or **nerve cell**.

They send electrical signals around your body.

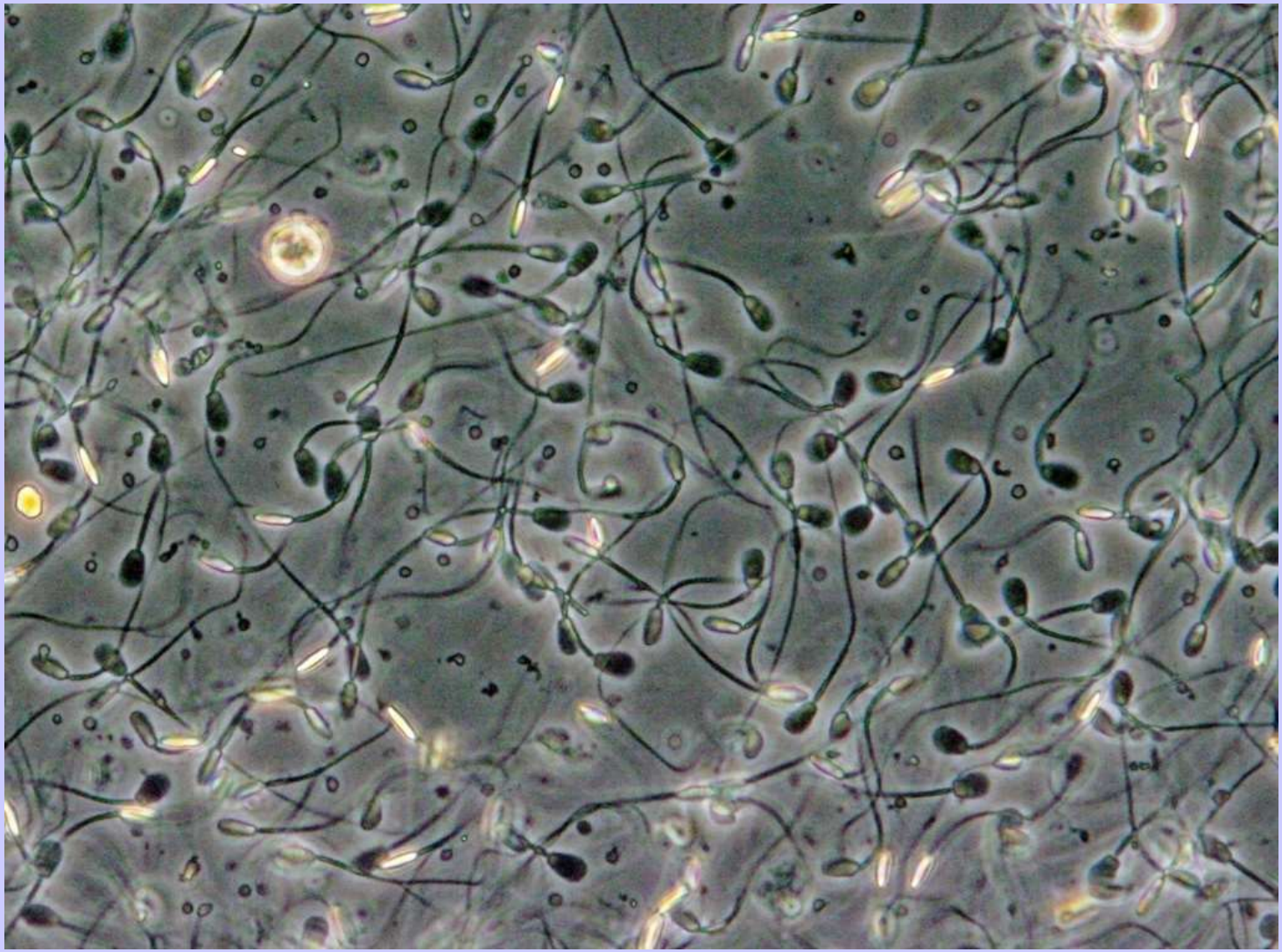
FUN FACT - The longest neuron in the human body has a single threadlike projection (the axon), a few micrometers in diameter, that reaches from the base of the spine to the foot, a distance of up to one meter



These cells have tails to help them swim towards an egg –

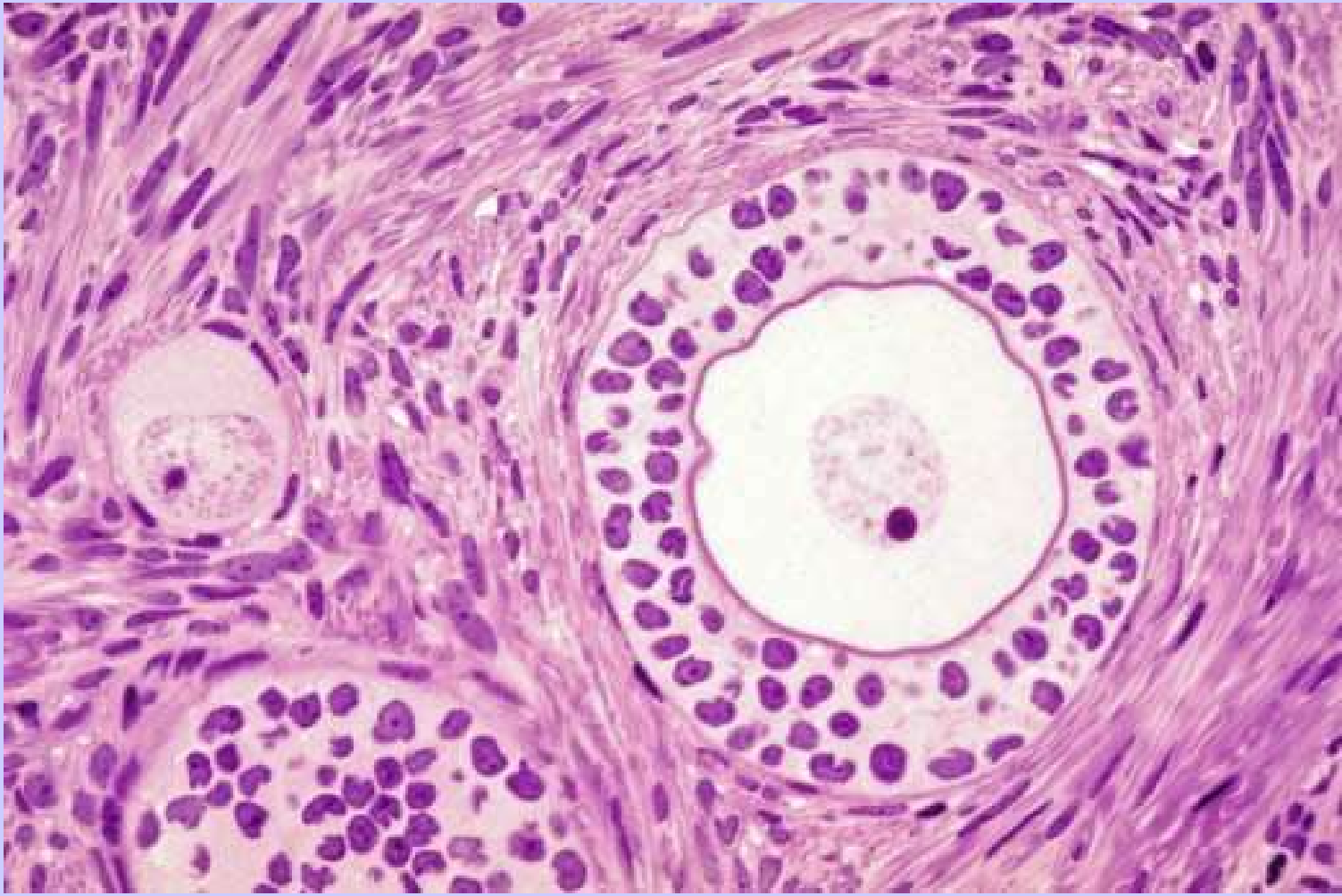
They are **sperm cells.**

Sperm cells are the **smallest** cell in the human body.



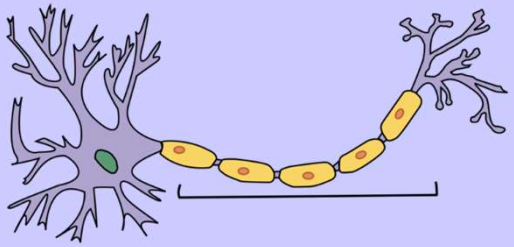
This image shows 2 egg cells at different stages of development (growth).

Egg cells are the **largest** cell in the human body.



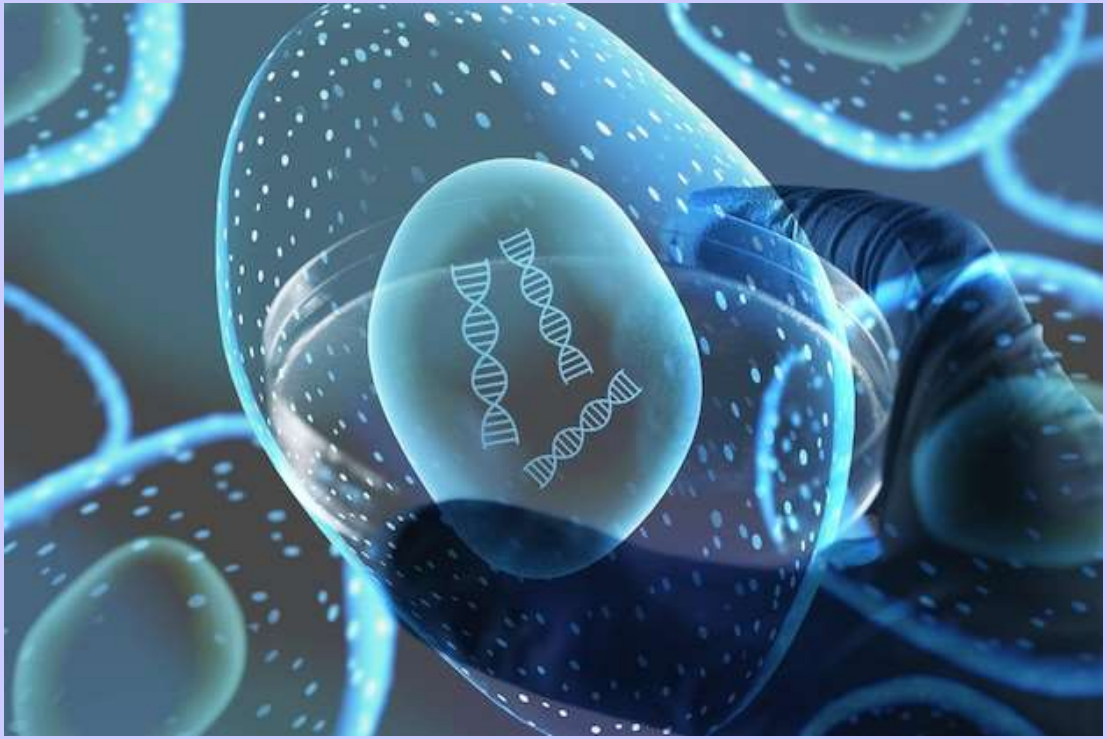
Cells

- Cells are the _____Building blocks_____ of life.
- There are many different types of cell, for example:
- Red Blood Cells carry _____oxygen_____
- _____Nerve cells_____ carry electrical impulses around the body.



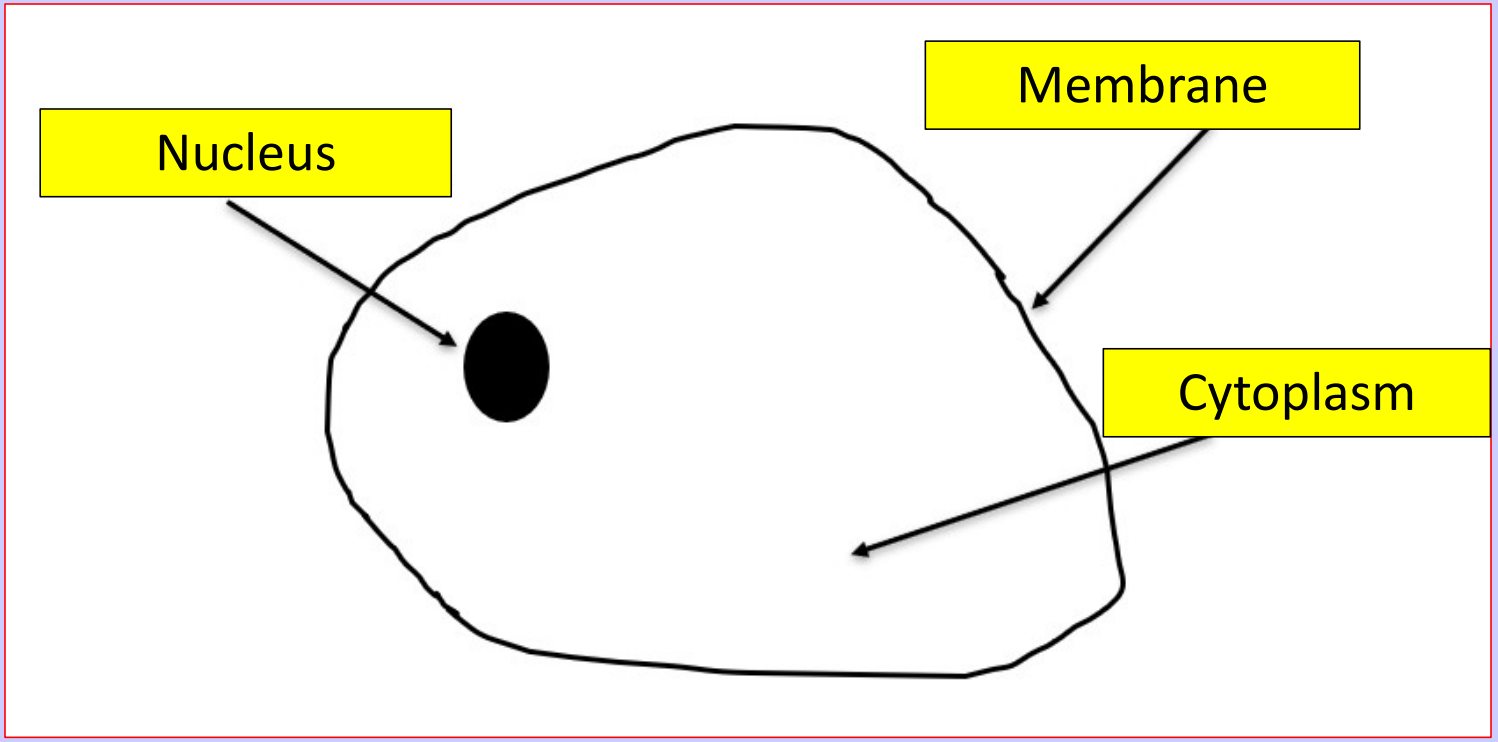
Animal Cells

- Now that you have had a look at a few different types of animal cell, we are now going to zoom in further and look at the structure of an animal cell.



Animal Cells

An animal cell has three main parts, the nucleus, membrane and cytoplasm.



Cell Structures

- Your cells can be compared to little factories.
- They contain lots of smaller structures, and each of them has a specific job.

Cell Structures

Structure	Function	Factory role
Nucleus		
Membrane		
Cytoplasm		

Nucleus

- The nucleus of the cell could be compared to the CEO or manager of the factory.
- It controls cell activities that go on in the cell.

Cell Structures – Learning Check

Structure	Function	Factory role
Nucleus	Controls cell activities	CEO or manager
Membrane		
Cytoplasm		

Membrane

- The membrane of the cell can be compared to the shipping department of a factory.
- It is responsible for controlling entry and exit of substances

Cell Structures – Learning Check

Structure	Function	Factory role
Nucleus	Controls cell activities	CEO or manager
Membrane	Controls entry and exit of substances	Shipping department
Cytoplasm		

Cytoplasm

- The cytoplasm can be compared to the factory floor.
- The cytoplasm is the site of chemical reactions in the cell.

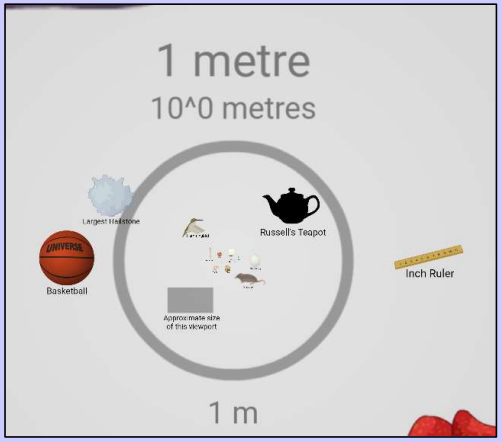
Cell Structures – Learning Check

Structure	Function	Factory role
Nucleus	Controls cell activities	CEO or manager
Membrane	Controls entry and exit of substances	Shipping department
Cytoplasm	Site of chemical reactions	Factory floor

Cells – Problem Solving

- Your teacher will show you the scale of the universe –
  - Complete the table, writing down the size (in micrometres) of the following cells/structures.

Cell Structure	Size (µm)
Ovum (egg) Cell	120
Skin Cell	35
White Blood Cell	10
Red Blood Cell	7
Cell Nucleus	7



Problem Solving - Extension

1. How many human skin cells could we fit in a human ovum?
   120 / 35 = 3.43 skin cells
2. How many white blood cells could we fit in a human ovum?
   120 / 10 = 12 white blood cells
3. How many times bigger than a red blood cell is a skin cell?
   35 / 7 = 5 times bigger

Red blood cells DO NOT have a nucleus. Why might this be?

Cells

24/09/2024

Plenary:

Write down three things you have learned today.

CHALLENGE – Try to find out about an interesting cell that can be found in the human body. Use the internet to do this and report back to the class next lesson with what you have found.

Success Criteria

- ❑I can state the main types of cells in the body
- ❑I can describe the function of different types of cells

Tick me at the end if ***you can*** …

Cells Under the Microscope

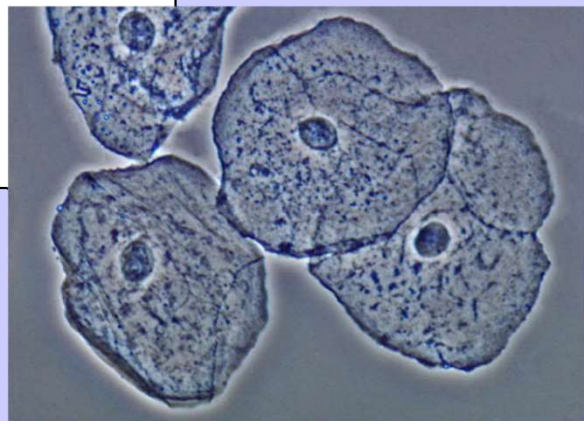
24/09/2024

Starter:

1. State the function of the nucleus in an animal cell.

2. State which structure controls entry and exit of substances.

3. Name the piece of equipment used to see cells.



Cells Under the Microscope

24/09/2024

Learning Intentions:

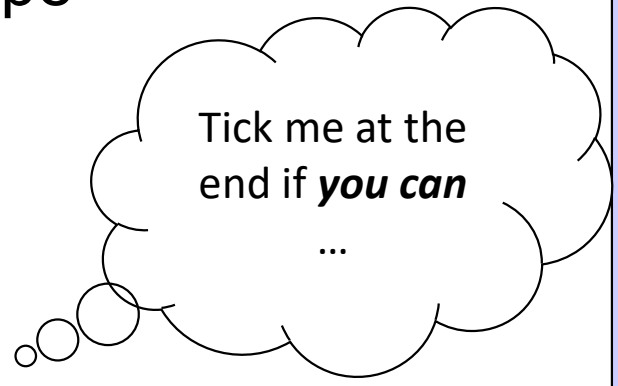
- I am learning about how to use a microscope to view cells.

Cells Under the Microscope

24/09/2024

Success Criteria

- ❑I can use a microscope
- ❑I can view my own cheek cells using a microscope



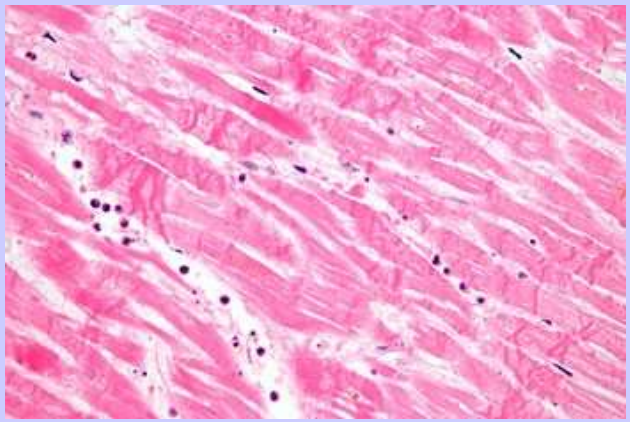
Microscopy

Why might microscopes be used in a hospital lab?

Microscopy

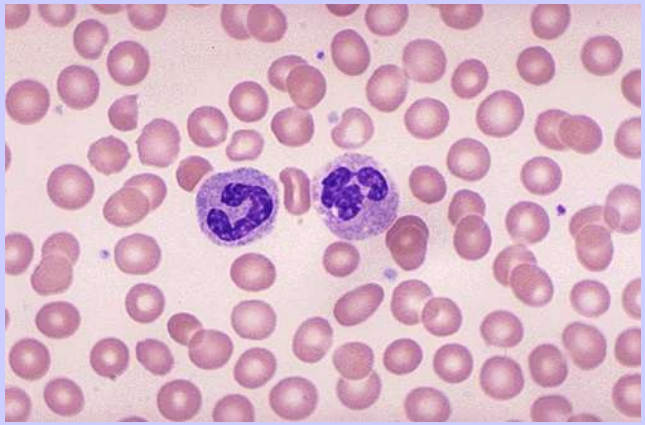
Microscopes are used in laboratories in hospitals for a variety of reasons:

- Histopathology – to look at very thin samples of tissue taken from biopsies



Cardiac muscle cells

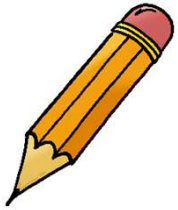
- Haematology – to look at samples of blood to see the types of cells present.



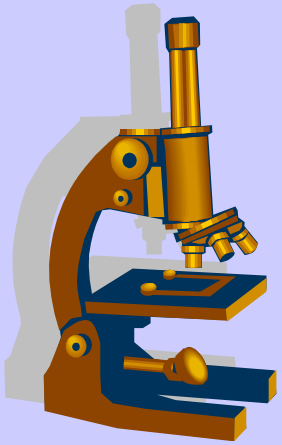
Blood sample - red blood cells, platelets and neutrophils (a type of white blood cell).

Microscopes

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

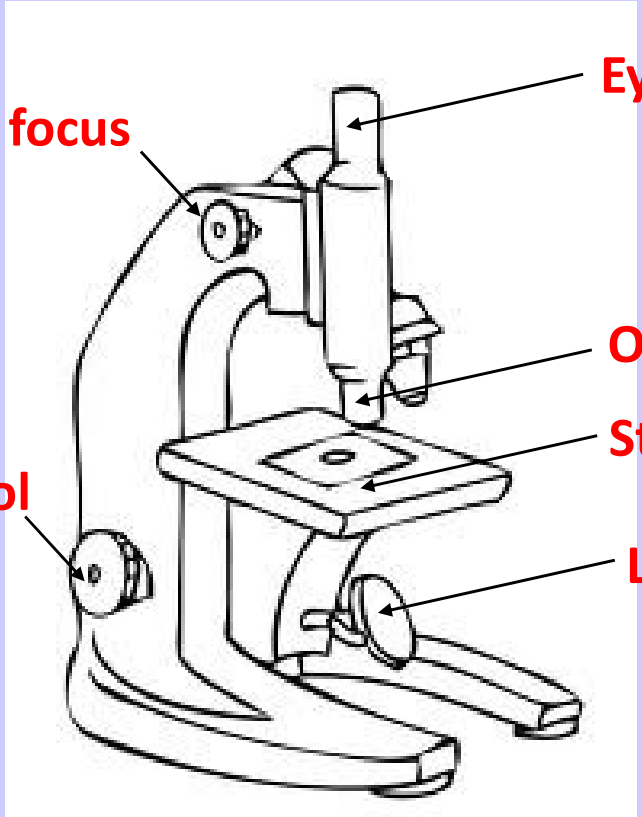


Micro-organisms such as bacteria and yeast are very **small**. You can use a microscope to look at some types of micro-organism.



Microscopes

- Label the parts of the microscope:



BBC Learn video: Microscopy

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

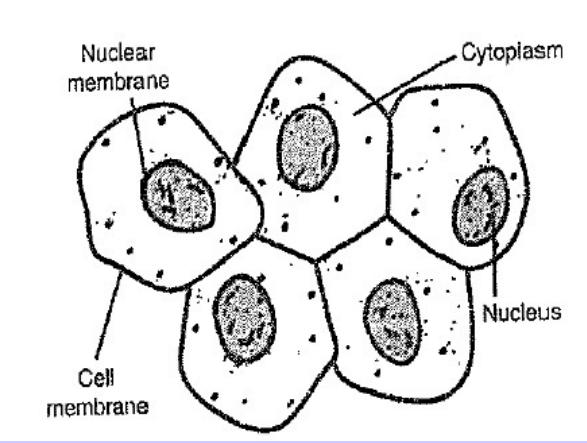
Staining Cheek Cells

Page 7

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

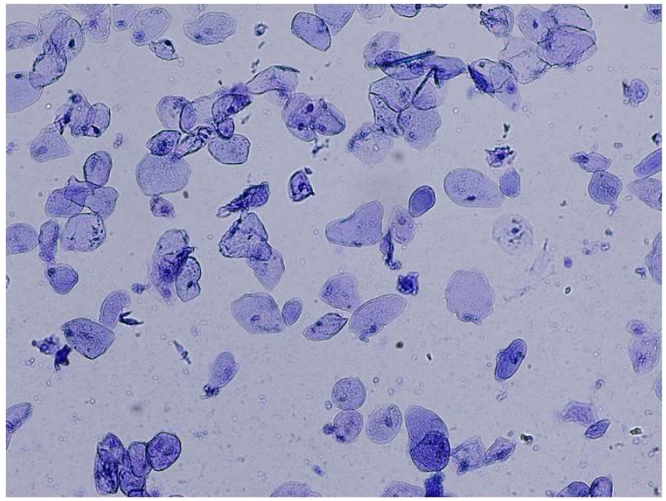
Method: *(What did you do?)*

1. Rub the cotton bud on the inside of your mouth for about **5 seconds**.
2. Now roll the cotton bud onto the middle section of your **microscope slide** for about 5 seconds.
3. Add 1 drop of **methylene blue** dye.
4. Place a cover slip on top of your cells.
5. Blot with a paper towel.
6. Now you can view the **cheek cells** under the microscope.



Staining Cheek Cells

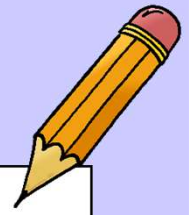
Results: *Draw a diagram of the cheek cells under the microscope, labelling the nucleus, cytoplasm and cell membrane. Also, remember to write down the magnification you used!*



Magnification: _____

Staining Cheek Cells

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



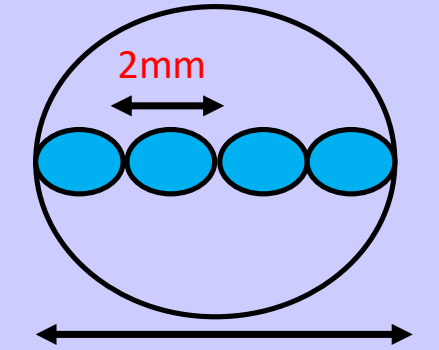
Conclusion: *(answer your aim)*

Estimating Cell Size

- To calculate the length of **one cell** in our field of view down a microscope we can work out the **diameter** and divide it by the **number of cells**.

Length of one cell = diameter / number of cells

- Can you use this formula to work out the **length of one cell** in this example?



Field of view = 8mm

Example:

Space for working.

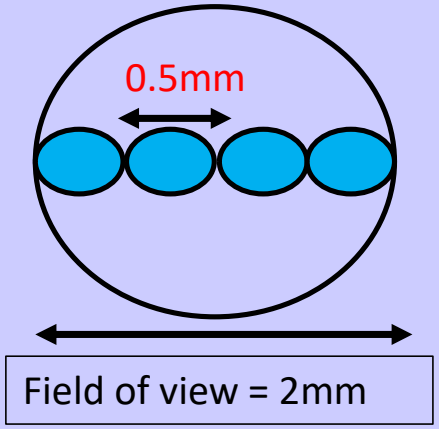
8mm / 4 cells = 2mm

Answer _____

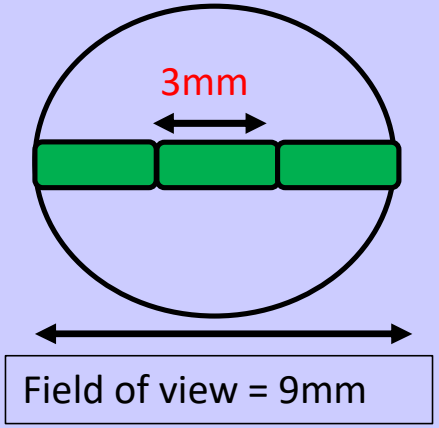
Estimating Cell Size

Length of one cell = diameter / number of cells

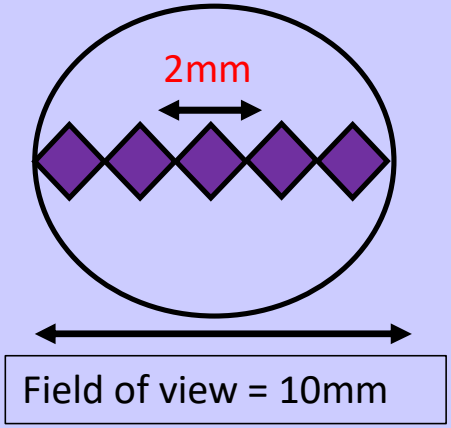
- Can you use this formula to work out the **length of one cell** in these examples?



2mm / 4 cells = 0.5mm



9mm / 3 cells = 3mm



10mm / 5 cells = 2mm

Cells Under the Microscope

24/09/2024

Plenary:

Write a true or false statement about something you have learned today. Swap with a partner, can they answer correctly?

Success Criteria

- ❑ I can use a microscope
- ❑ I can view my own cheek cells using a microscope

Tick me at the end if ***you can*** …

Types of Microbes

24/09/2024

Starter:

What causes rotting and mould?

Types of Microbes

24/09/2024

Learning Intentions:

- To identify and compare the different types of microbes.
- To use numeracy skills to solve simple size and scale problems

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

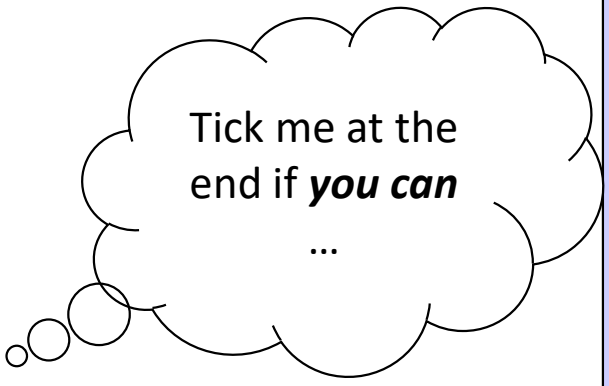
MICROBIOLOGY SOCIETY

Types of Microbes

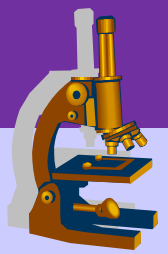
24/09/2024

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?

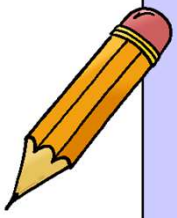
Fungi

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



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

Microbes Numeracy

Answer the following questions in your booklet.

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

Page 11

4. 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

5. 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!

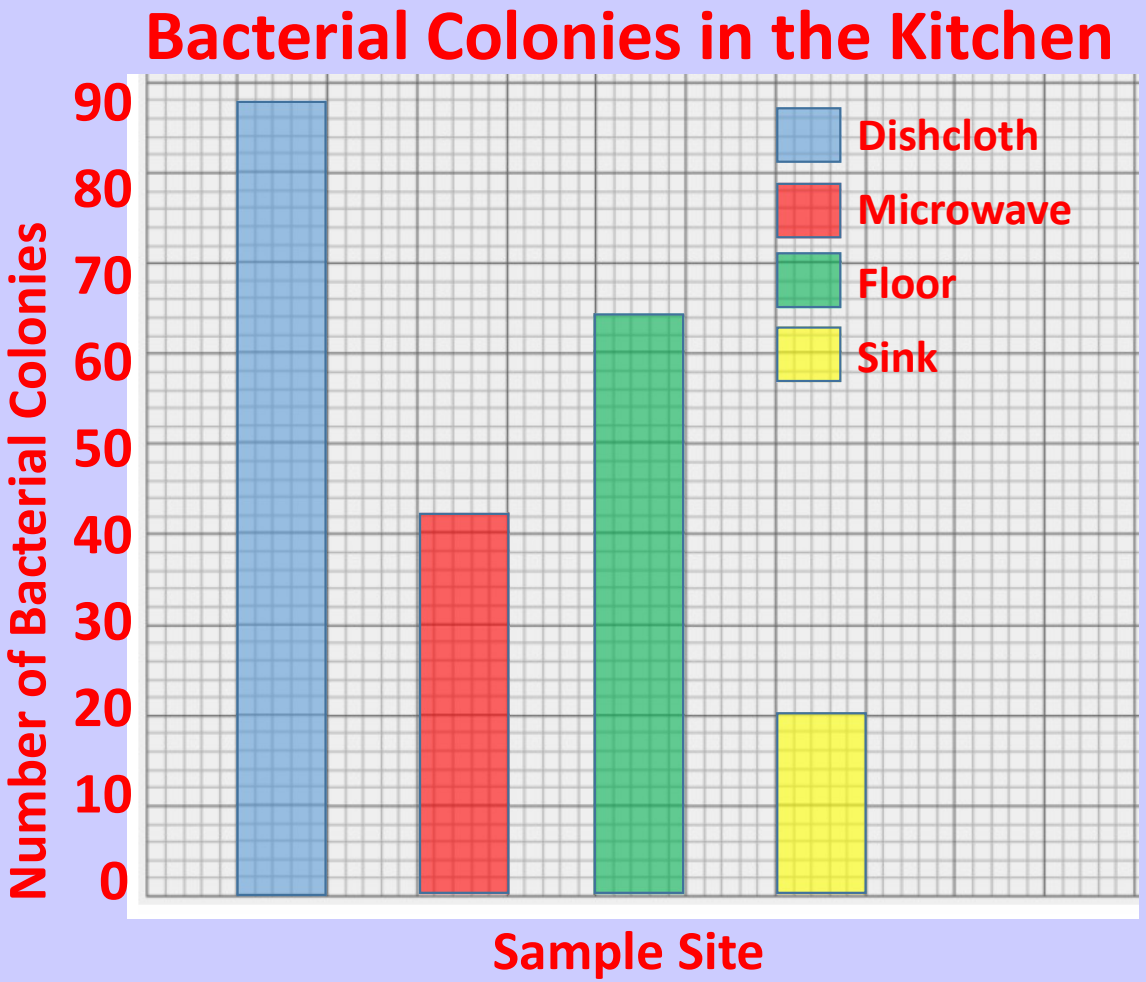
Time (minutes)	**0**	**20**	**40**	**60**	**80**	**100**	**120**
No. of bacteria	1	2	4	8	16	32	64

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

Microbes Numeracy

6. Bar Graph

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



Time lapse food decay

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

Types of Microbes

24/09/2024

Plenary:

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

BBC Learn video: Microorganisms and bacteria

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

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

Tick me at the end if ***you can*** …

Aseptic Technique

24/09/2024

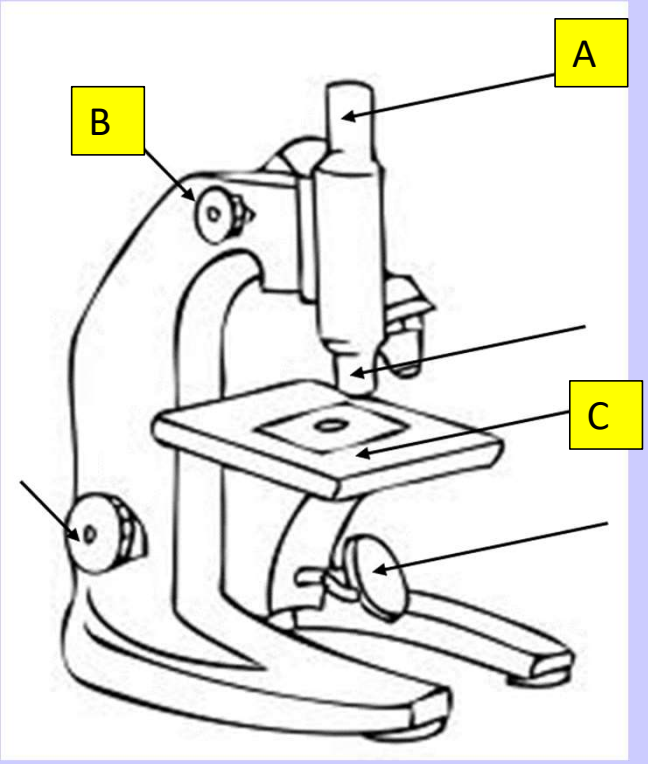
Starter:

Label parts A-C on the microscope.

A _____

B _____

C _____



Aseptic Technique

24/09/2024

Learning Intentions:

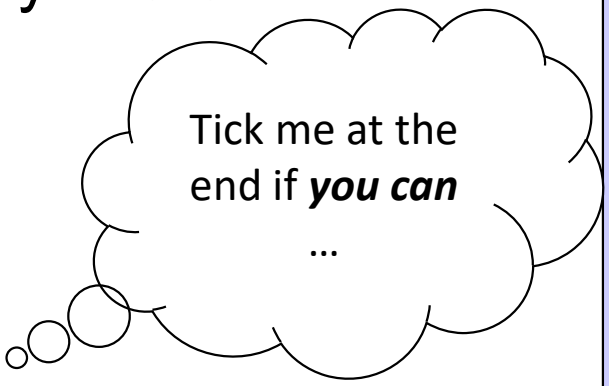
- To describe aseptic technique
- To use an appropriate technique to grow microbes.

Aseptic Technique

24/09/2024

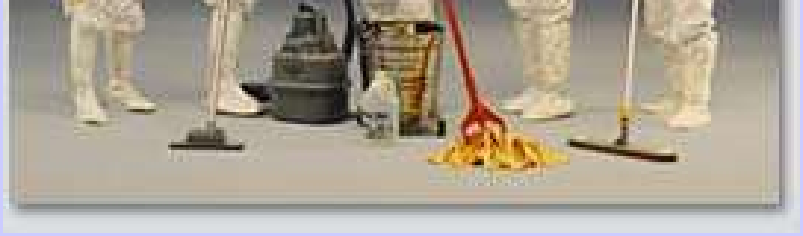
Success Criteria

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



Aseptic Technique

- Aseptic means the _____absence_____ of microorganisms that can cause _____disease_____.
- Sterile techniques must be used when working with micro-organisms
- This prevents _____Contamination_____



Examples of Aseptic Technique

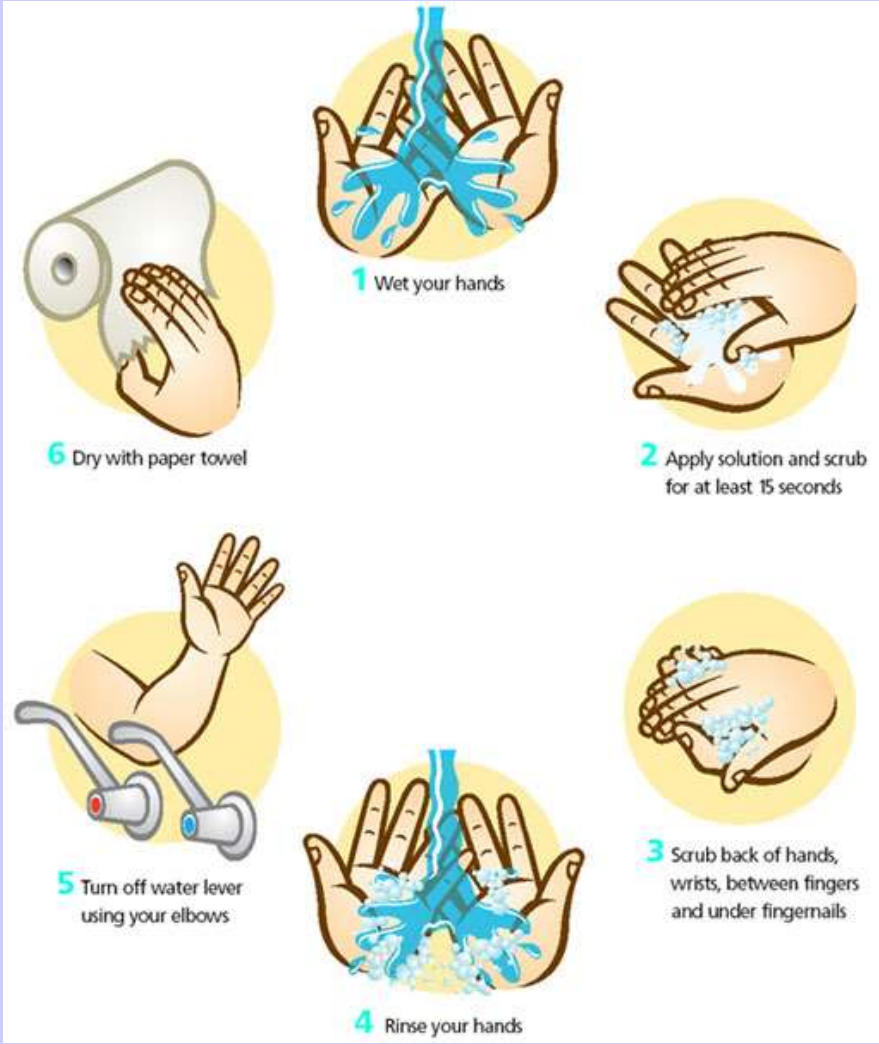
Lab coats

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

Petri dishes closed

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

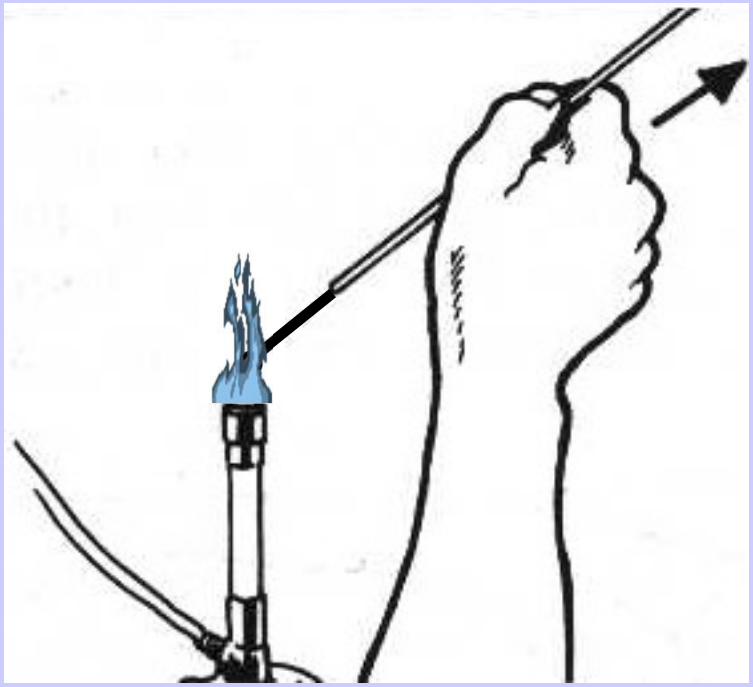
Why do we ensure petri dishes are closed?

Examples of Aseptic Technique

Flaming the wire loop

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

Why do we flame the wire loop?



Examples of Aseptic Technique

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?*

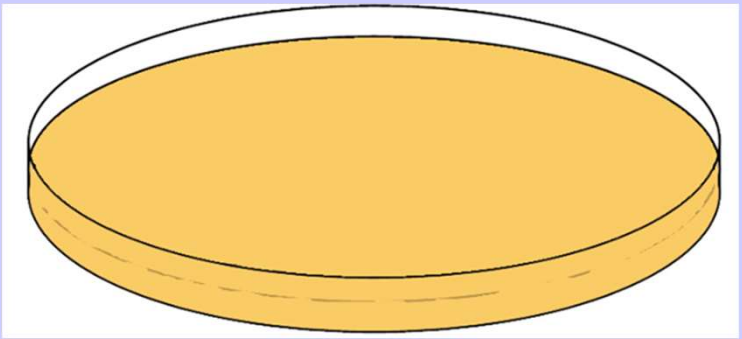
The microbes need oxygen to grow

Examples of Aseptic Technique

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

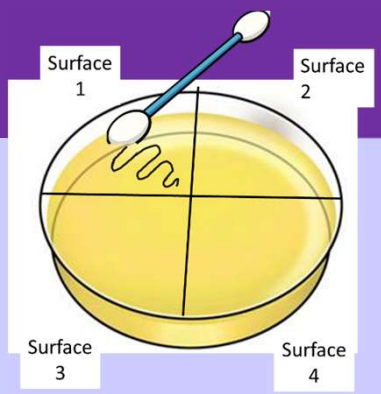
Growing Microorganisms

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

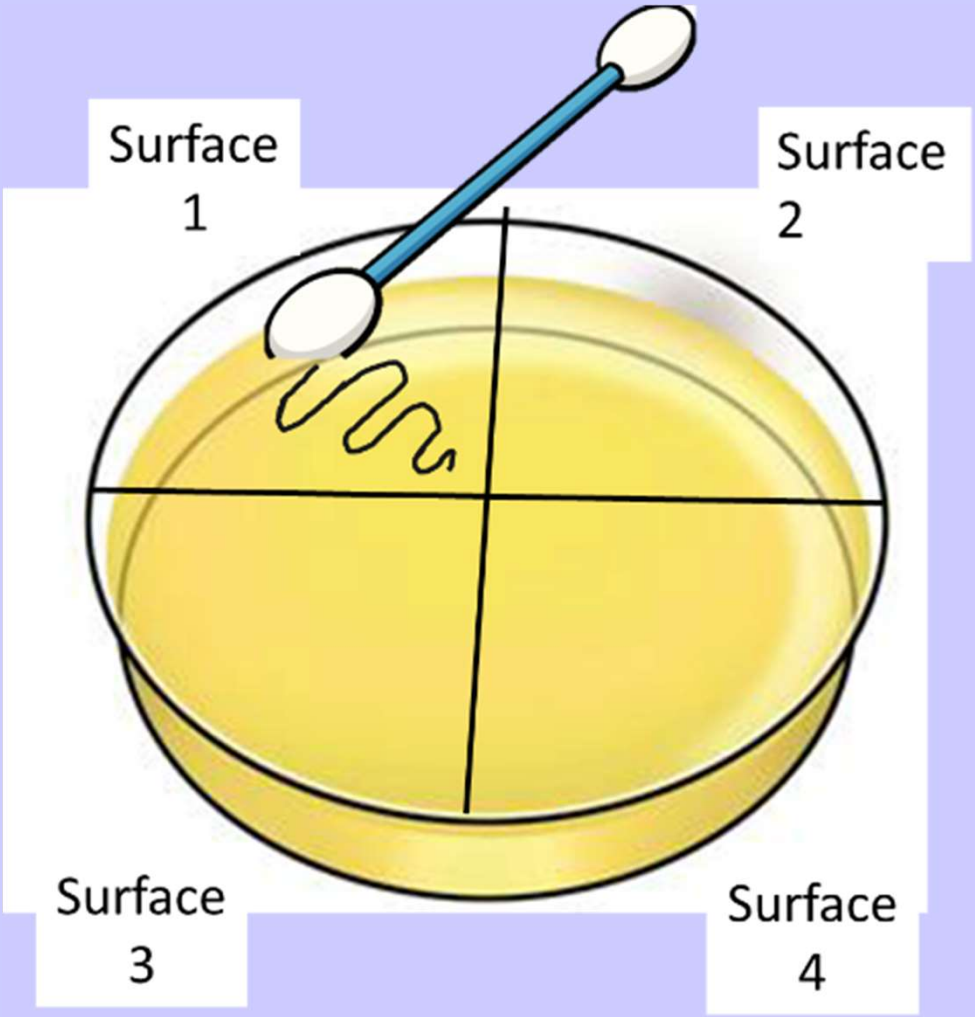


Aim: To investigate the microorganisms in the surrounding environment

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



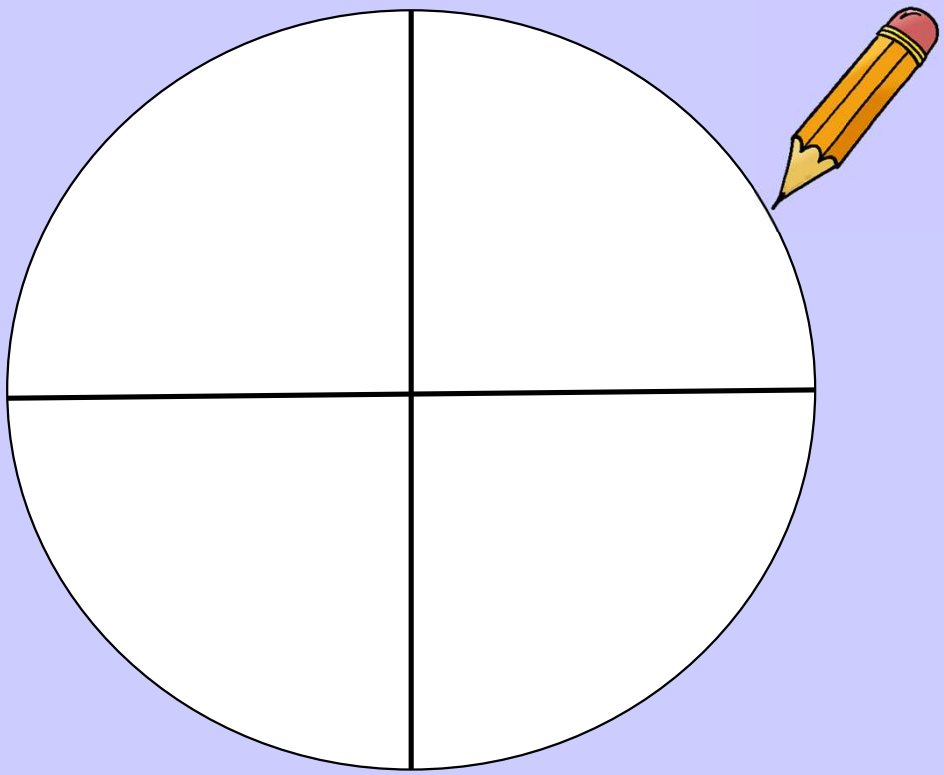
Growing Microorganisms

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:

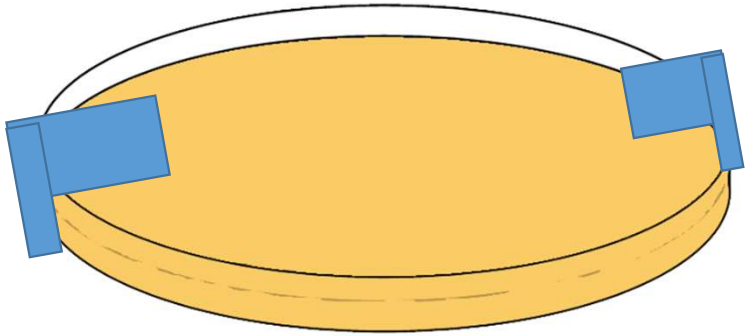
If you were to do the experiment again, what would you do differently? How could you make your experiment more reliable? Should you have used a control?

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.



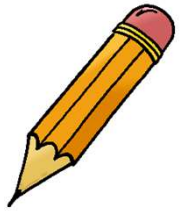
Growing Microorganisms in the Air - Demonstration

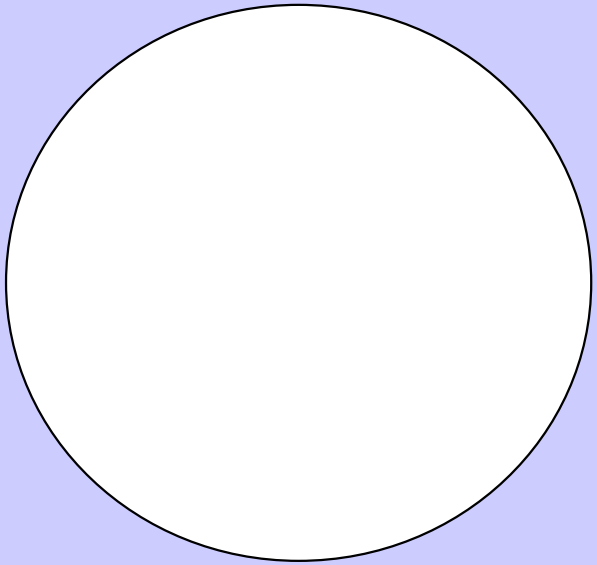
Results:

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

How many different colonies can you count?

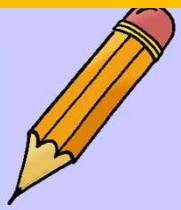
Draw your agar plate once the microbes have grown.





Growing Microorganisms

Aim: To investigate the microorganisms in the air

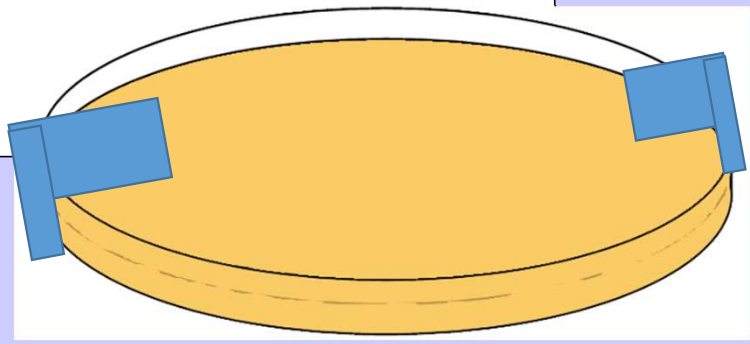


Conclusion:

Write a conclusion for your experiment which answers the aim.

Evaluation:

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



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

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

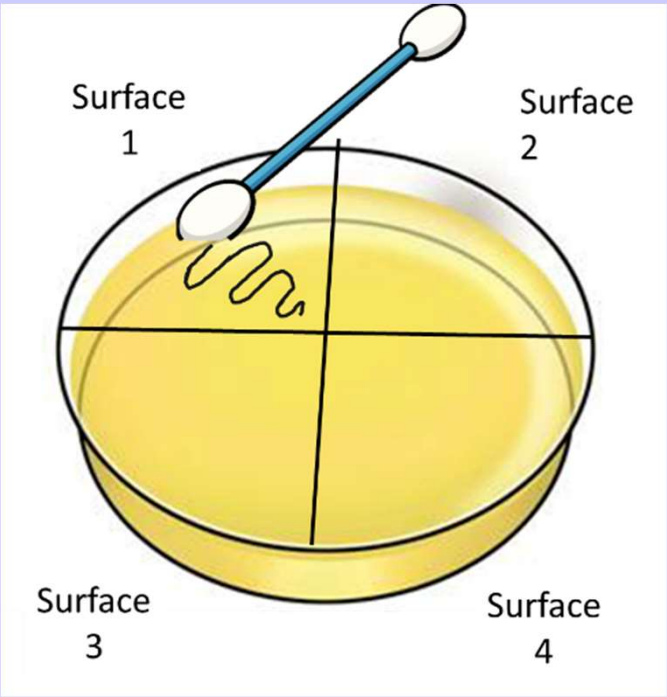
- ❑ I can describe one or more aseptic technique
- ❑ I can protect an experiment from contamination
- ❑ I can show by experiment that microbes are everywhere

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:

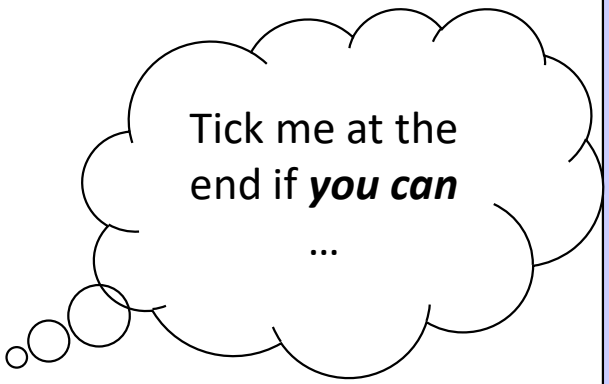
- Use an appropriate technique to grow microbes.
- Explain the importance of hand washing in preventing the spread of microbes.
- Understand the difference between direct and indirect spread of microbes

Spreading Microbes

24/09/2024

Success Criteria

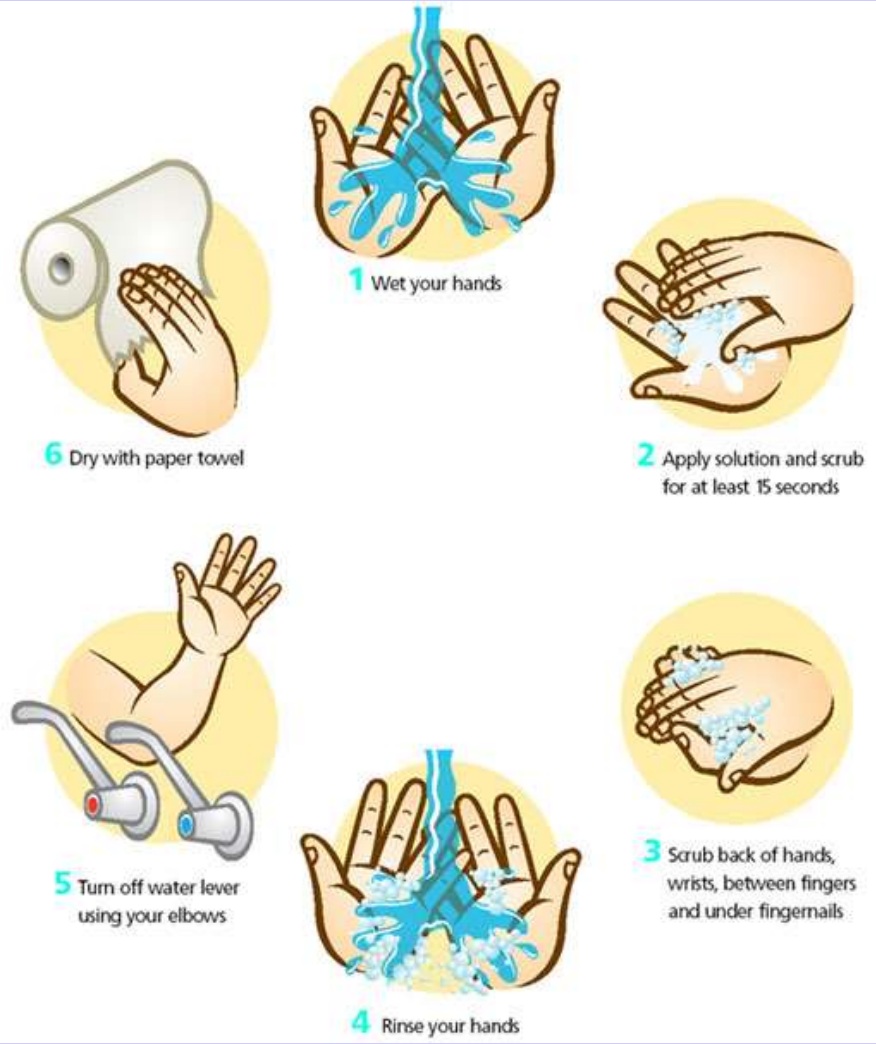
- ❑I can grow microbes on an agar plate
- ❑I can explain the importance of hand hygiene
- ❑I can describe the difference between the direct and indirect spread of microbes



Recap: Examples of Aseptic Technique

Hand washing

Why do we wash our hands?



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

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

Hand Hygiene Technique with Soap and Water

Duration of the entire procedure: 40-60 seconds

0

Wet hands with water;

1

Apply enough soap to cover all hand surfaces;

2

Rub hands palm to palm;

3

Right palm over left dorsum with interlaced fingers and vice versa;

4

Palm to palm with fingers interlaced;

5

Backs of fingers to opposing palms with fingers interlocked;

6

Rotational rubbing of left thumb clasped in right palm and vice versa;

7

Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

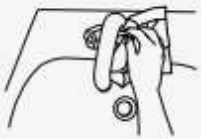
8

Rinse hands with water;

9

Dry hands thoroughly with a single use towel;

10



Use towel to turn off faucet;

11

Your hands are now safe.

Spreading Microbes Experiment

Now you have 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**.

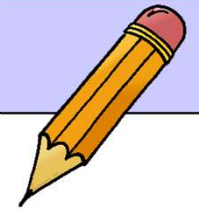
Spreading Microbes Experiment

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

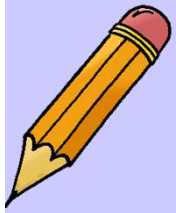
- Microbes can be passed from person to person by hand contact. This is called ____Direct_____ spread of microbes.
- Touching contaminated surfaces such as door handles can pass microbes on ____indirect_____ spread of microbes.
- The simplest and most effective way to prevent the spread of microbes is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

Word bank:
indirect,
hand washing,
direct

Types of Microbes

Extension Activity

Read the following passage and then answer the questions below



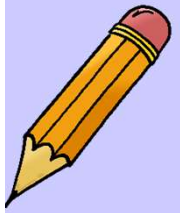
You may think that the world is full of dangerous, disease-causing microbes. In fact many microbes are useful to us whilst others are not harmful or useful.
Organisms, which cause diseases, are called **pathogens**. They can be divided into 4 main groups

- **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

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

- ❑ 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

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:

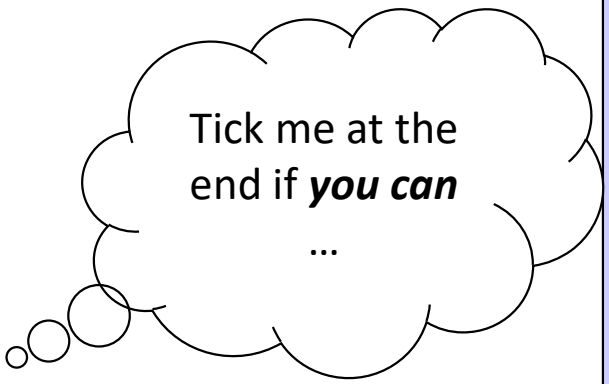
- To state two food products made using yeast
- To carry out a simple fermentation experiment

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

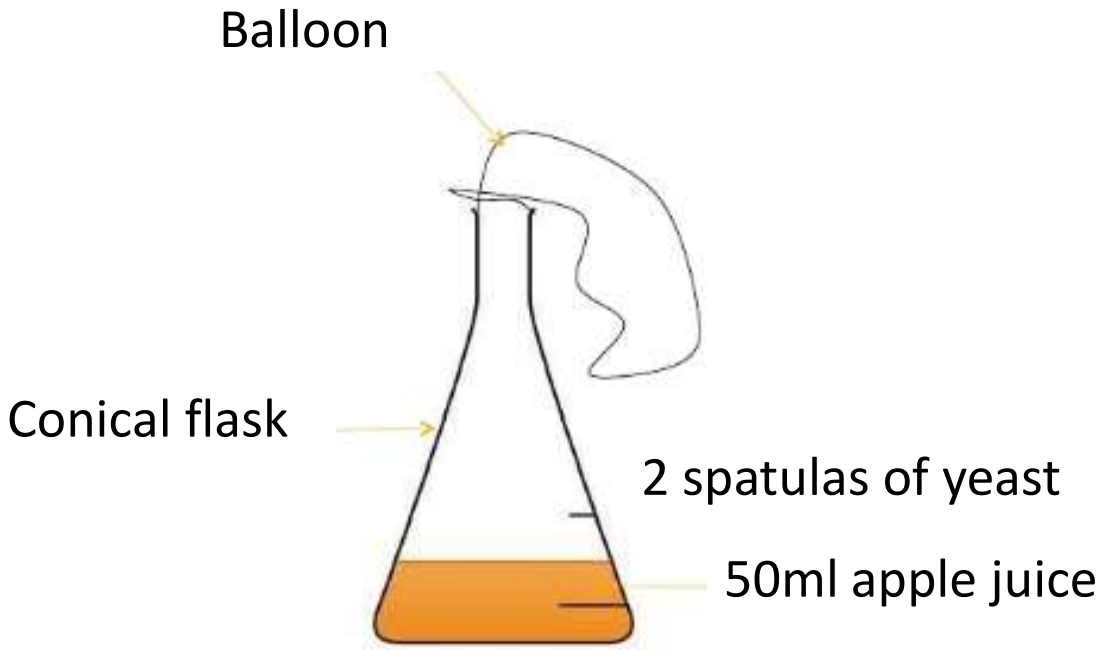
Aim: To investigate if yeast is needed to make alcohol.

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*

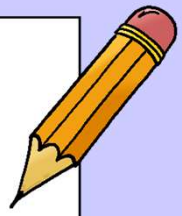


Fermentation Experiment

Results:

Look at your brewing experiment from last lesson.

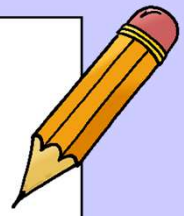
Draw a diagram of what you observed.



Fermentation Experiment

Conclusion:

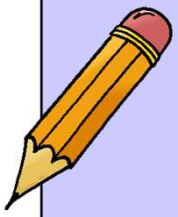
Describe what happened to the balloon and give a reason for this.



Fermentation Experiment

Evaluation:

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



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

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

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

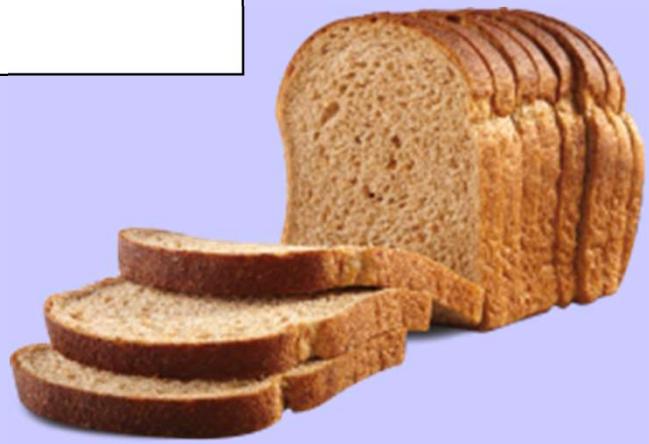
Making Bread

24/09/2024

Starter:

1. Write the fermentation equation.

2. Name two products of fermentation.



Making Bread

24/09/2024

Learning Intentions:

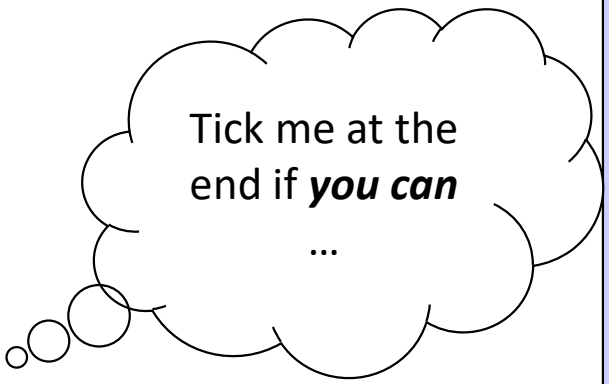
- To state two food products made using yeast
- To carry out a simple fermentation experiment

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.

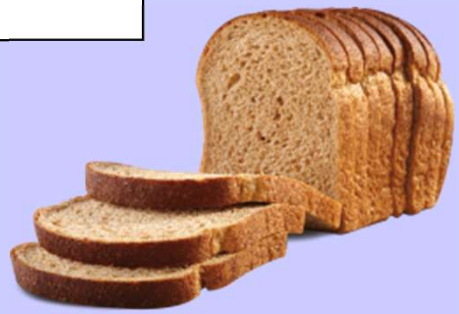
Dough made with yeast

Dough made without yeast

Yeast - Bread

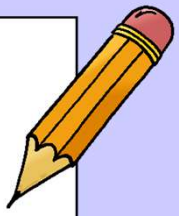
Copy the fermentation equation into the booklet.

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



Making Dough

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

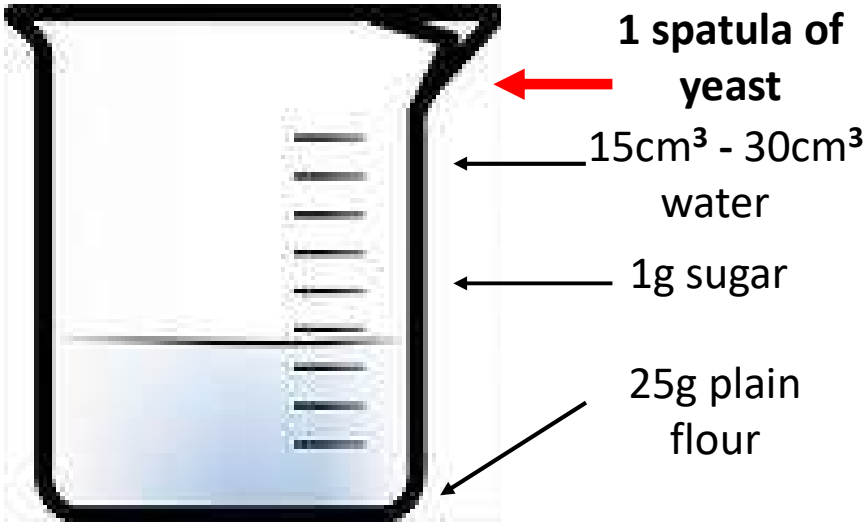


Method:

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 cm^3 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*

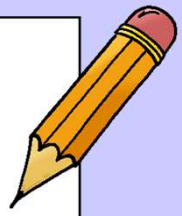


Making Dough

Results:

Look at your dough from last lesson.

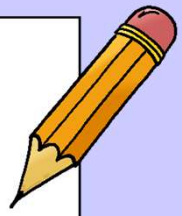
Draw a diagram of what you observed.



Making Dough

Conclusion:

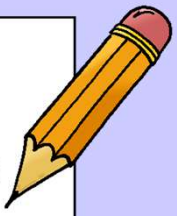
Describe what happened to the dough and give a reason for this.



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

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

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

Making Yoghurt

24/09/2024

Page 24

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:

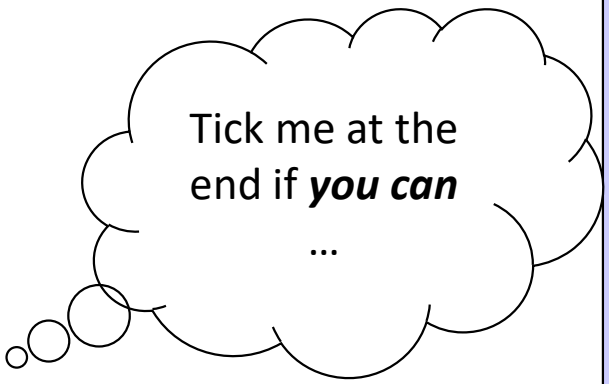
- To state two food products made using bacteria
- To carry out a simple fermentation experiment using bacteria

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____.

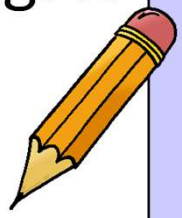
Probiotic products contain billions of _____live_____ bacteria which benefit the digestive system.

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

Making Yoghurt using Bacteria

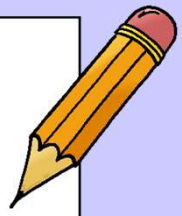
Lactobacillus is a type of ___bacteria___ used in yoghurt making. It changes the milk sugar lactose into lactic acid.

Copy the fermentation equation below into the booklet.



Lactose sugar —(Bacteria)→ Lactic Acid

Making Yoghurt



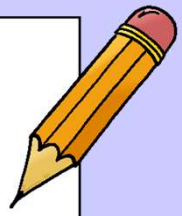
Aim: To investigate the effect of bacteria on the pH of milk.

Method:

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

Making Yoghurt

Results:

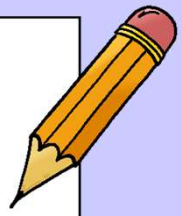


	Colour of pH paper	pH Number	pH: Acid/Alkali/Neutral?
Start			
Final			

Making Yoghurt

Conclusion:

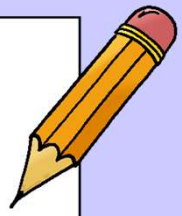
Describe what happened to the pH of the milk.



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?

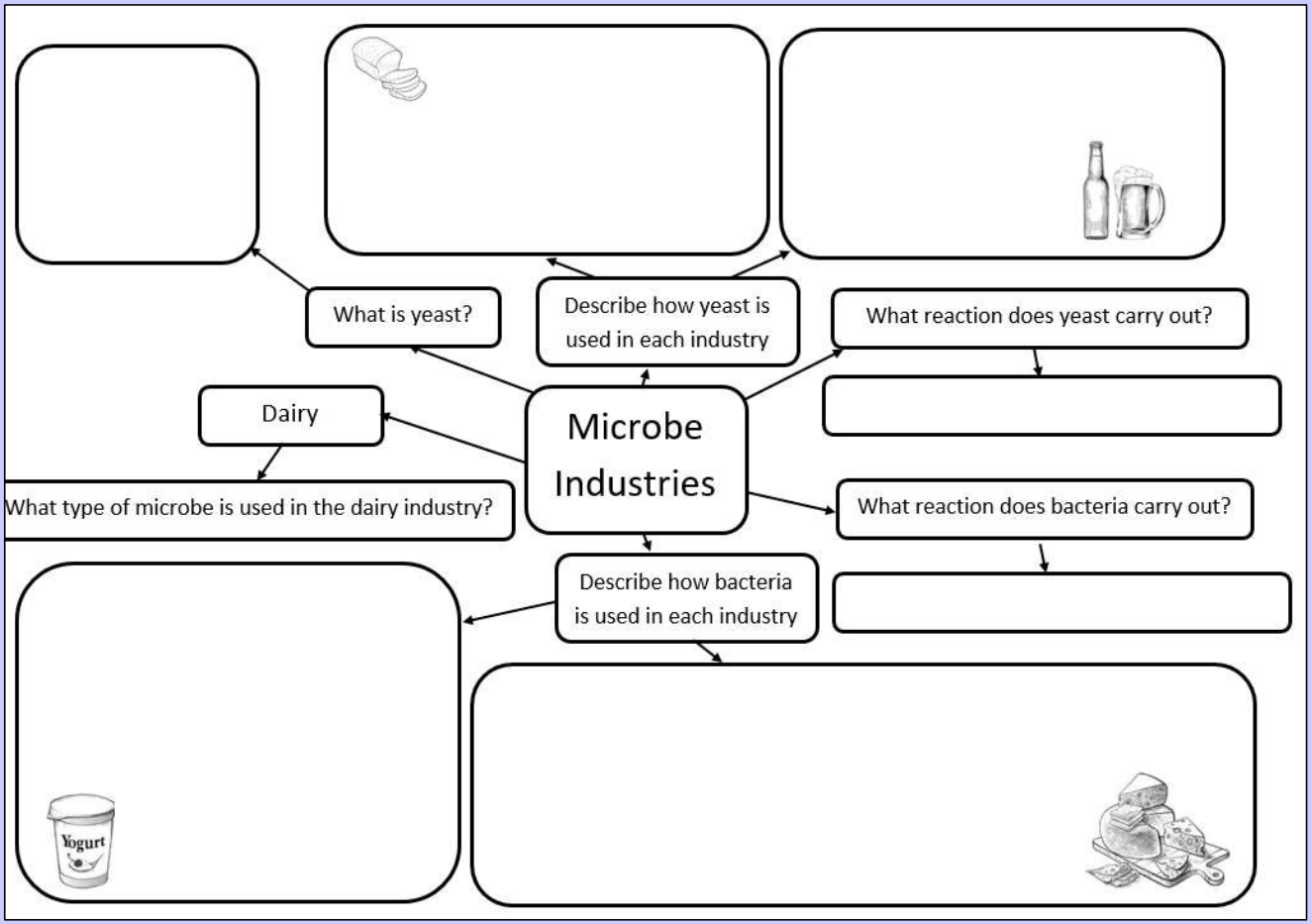
Success Criteria

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

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:

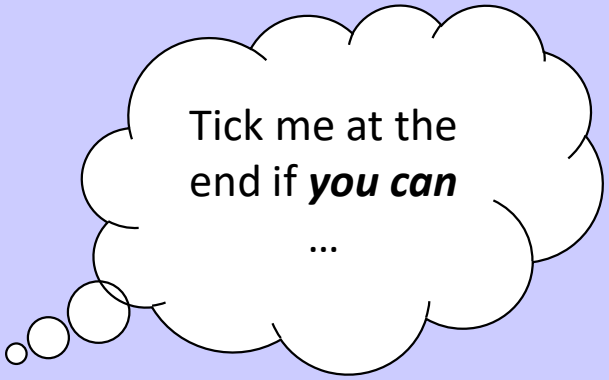
- To describe the role of the immune system
- To investigate the different ways that the body defends itself from microbes

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.



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:

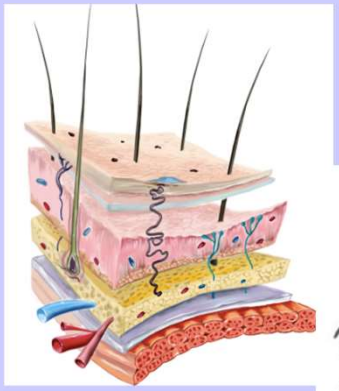
Prevent _____ microbes getting into the body

Destroy _____ microbes once they have got in

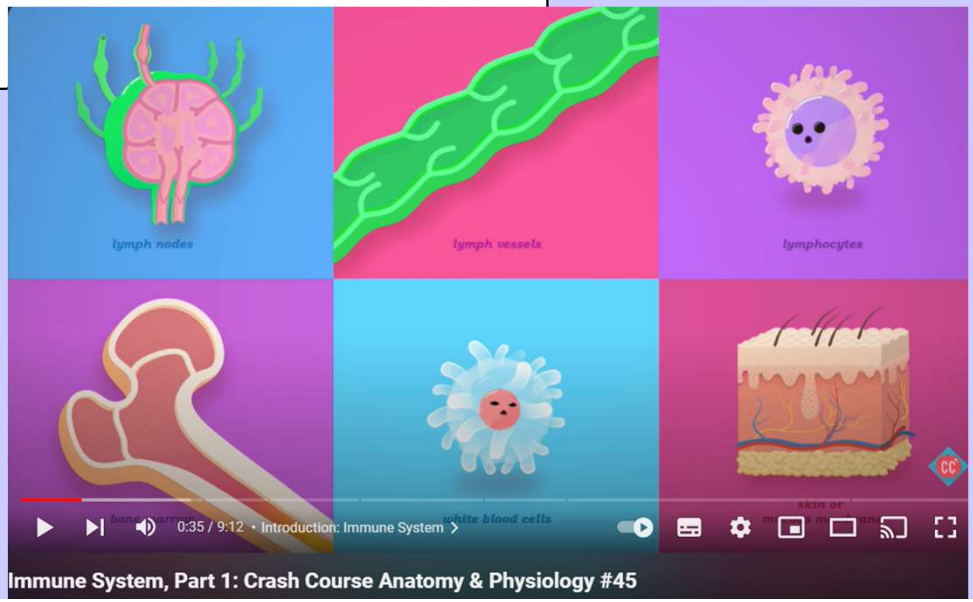
The first-line of defence

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.

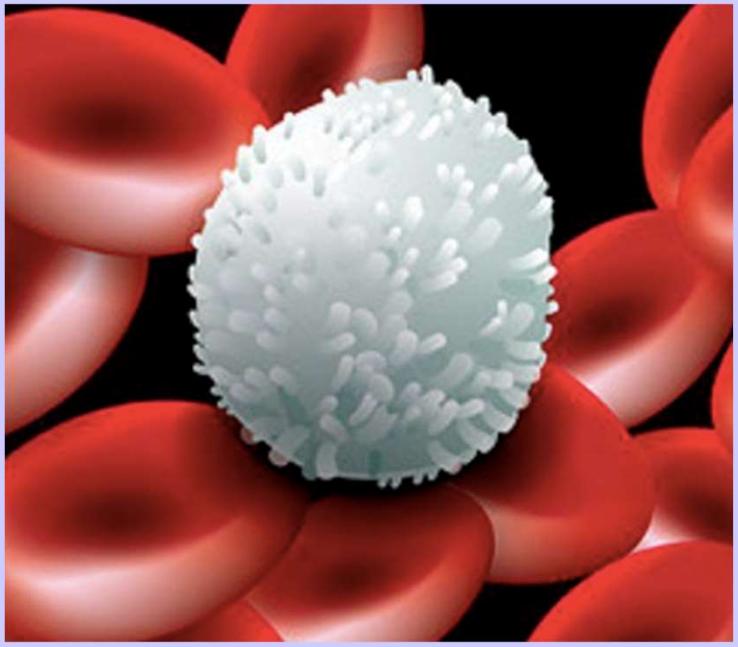
Can you think why this is?

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

Sustainable Development Goals

Numeracy Task

- **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 Task

Page 27

- **“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

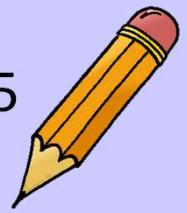
Numeracy Task

- **“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

Sustainable Development Goals

Numeracy Task



- 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 Task

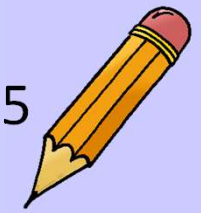
“An estimated 19.9 million children did not receive the vaccines during the first year of life, putting them at serious risk of these potentially fatal diseases. The estimated number of children in the whole world is 1.9 billion”

4. Using the information above, work out how many children in the whole world have been vaccinated during the first year of life

5. Challenge yourself: work out the percentage of children in the world that have been vaccinated

Sustainable Development Goals

Numeracy Task



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Sustainable Development Goals

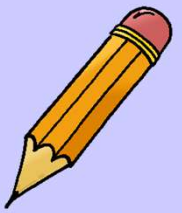
Numeracy Task

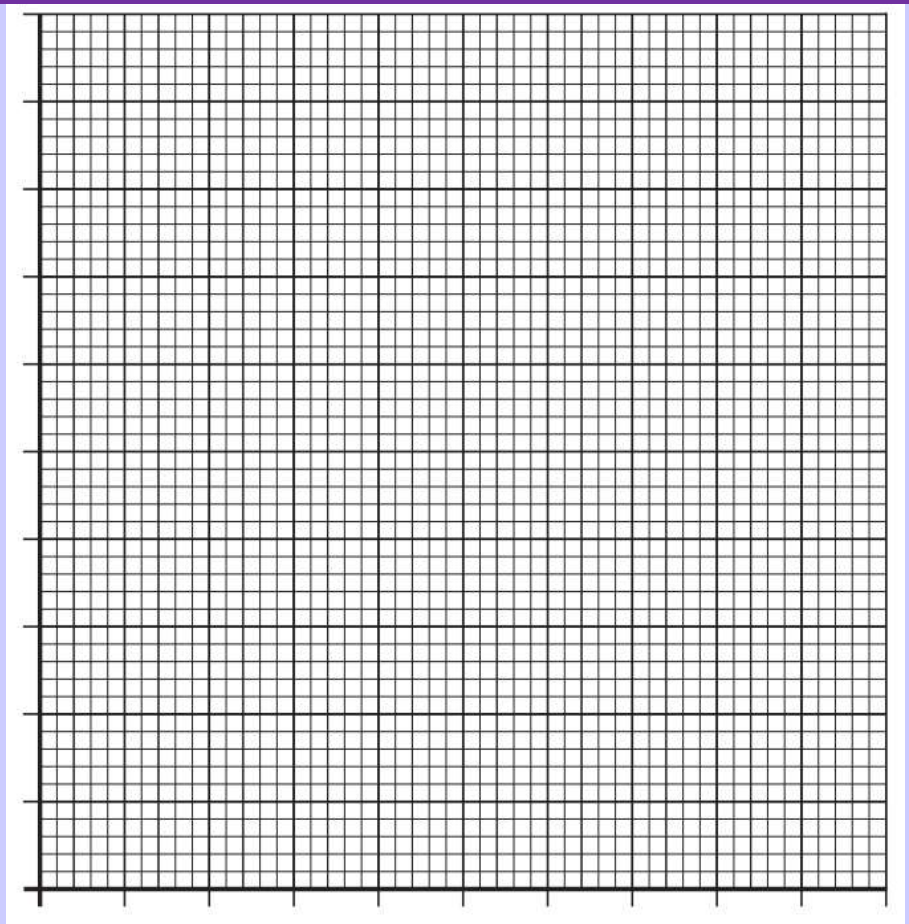
- **“Two doses of the measles vaccine are required to prevent the disease and the illnesses, disabilities and deaths caused by complications associated with it. Coverage with the second dose of measles vaccine increased from 59 per cent in 2015 to 67 per cent in 2017, but that is still insufficient to prevent this highly contagious disease.”**

6. Make a bar graph using the information above
    - Label the x-axis “Year”
    - Label the y-axis “Percentage coverage of vaccine (%)
    - Make a bar for each of the years 2000,2015,2017

Sustainable Development Goals

Numeracy Task





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……

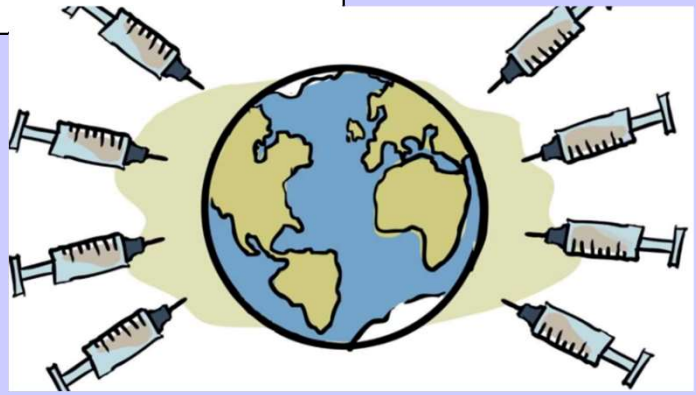
One thing I need to remember from today's lesson is……

Success Criteria

- ❑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.

Immunity and Vaccinations

Can you remember any vaccinations you've had?



Immunity and Vaccinations

24/09/2024

Learning Intentions:

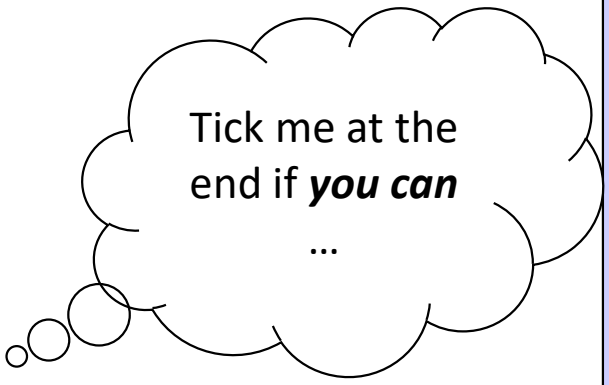
- To describe the development of vaccinations and their importance in preventing diseases

Immunity and Vaccinations

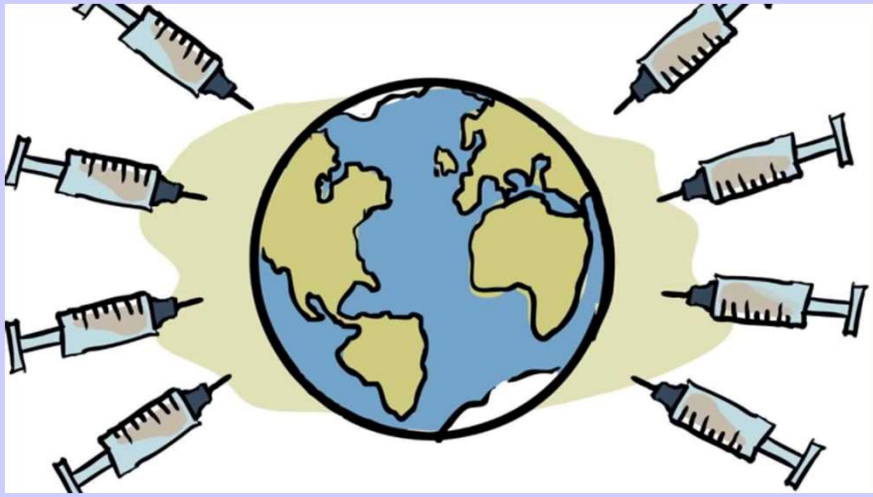
24/09/2024

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.

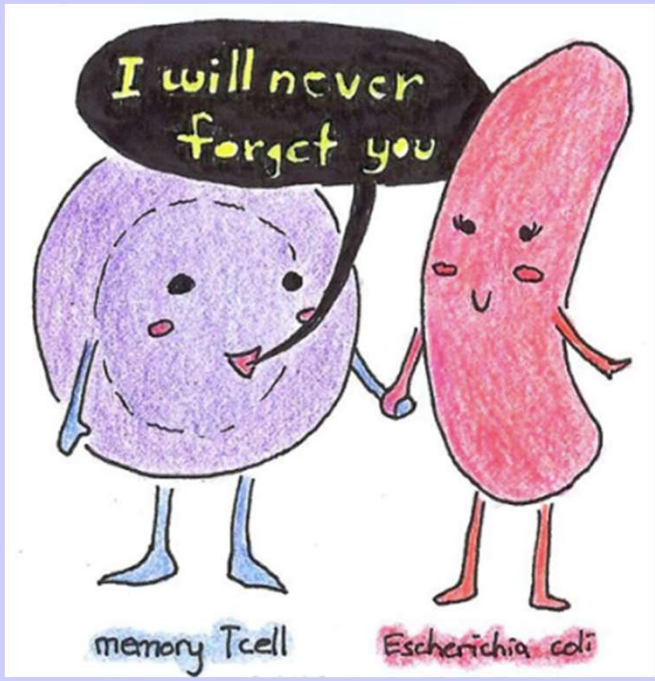
Immunity results from either being exposed to the disease before or by ___vaccination___.

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.

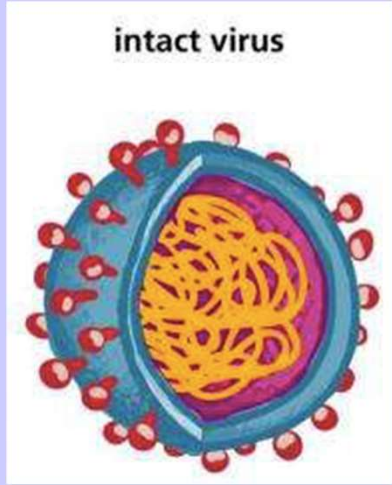
This is called **immunity**.

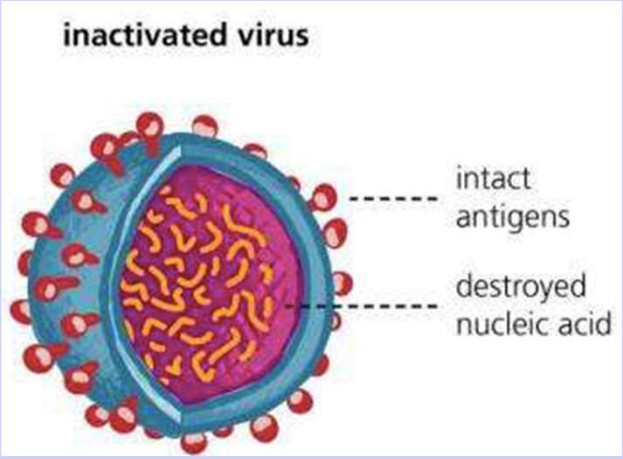


What is a vaccine?

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.



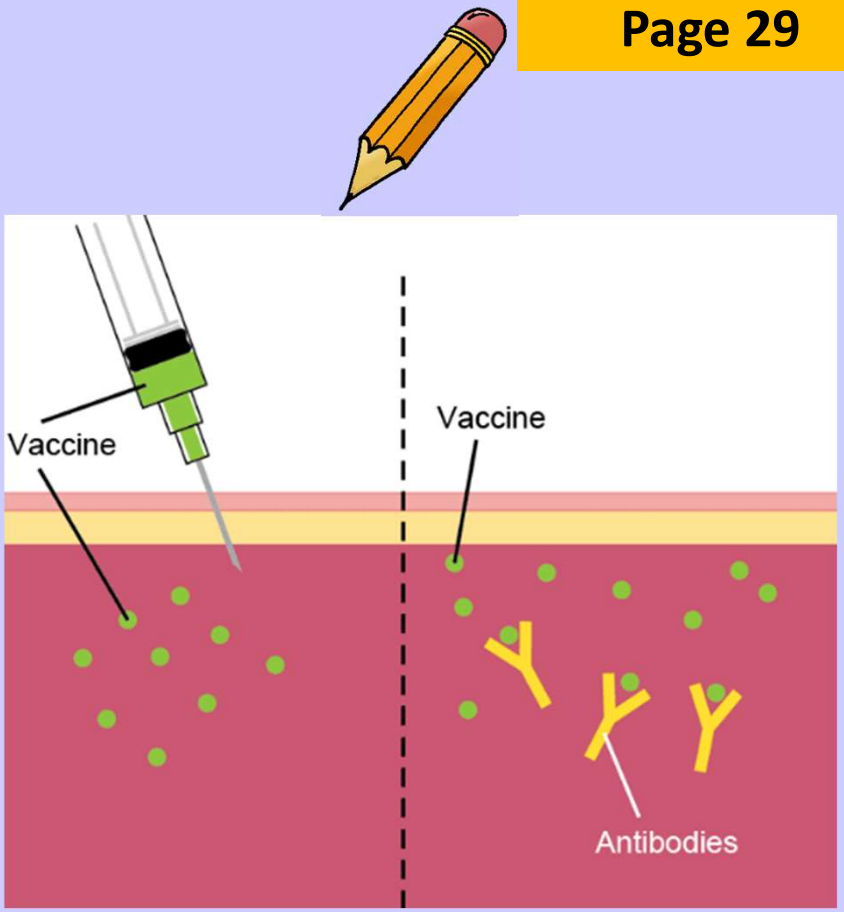


What is a vaccine?

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.



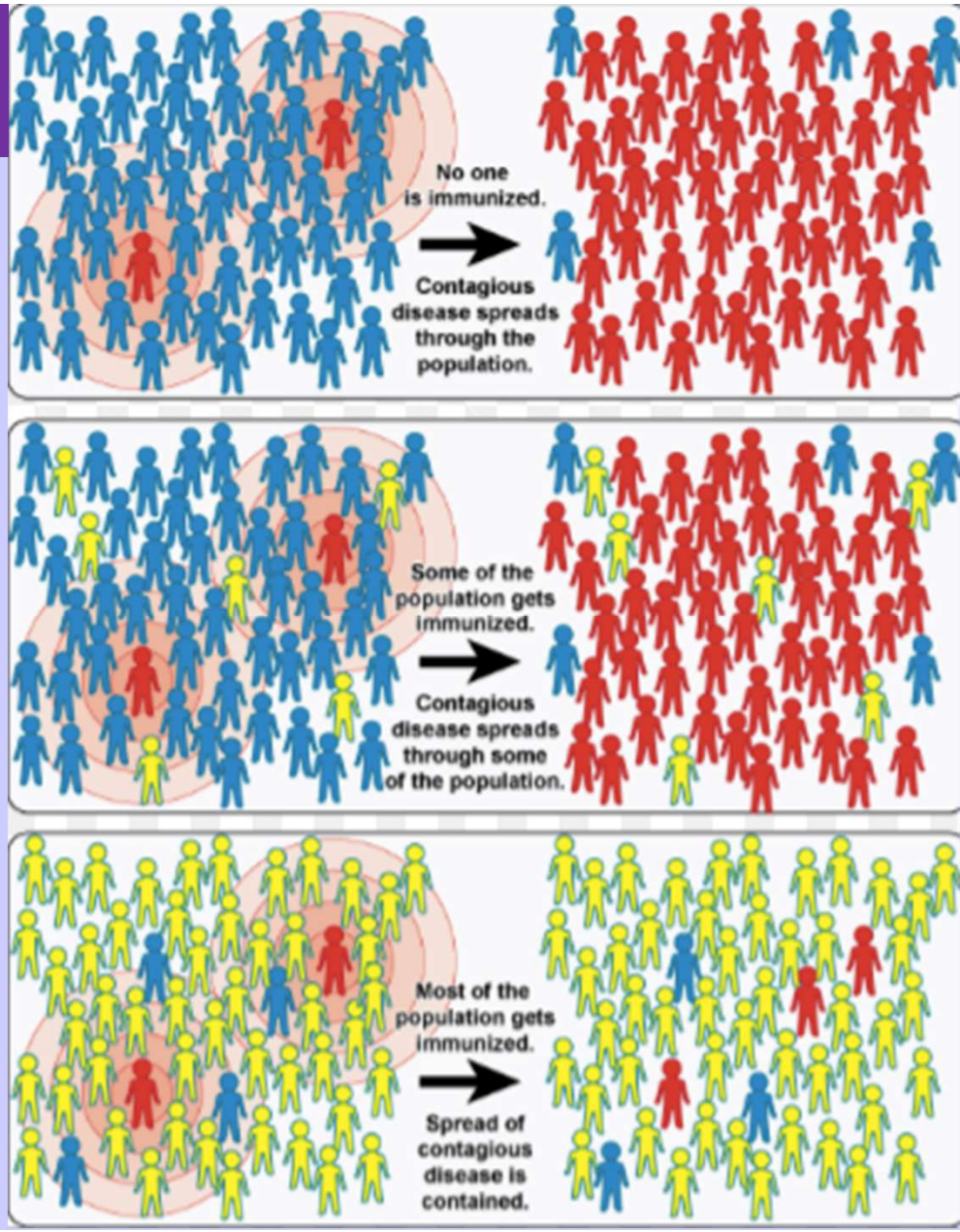
Smallpox

Activity: Watch the Smallpox video and note down three facts

Smallpox virus video

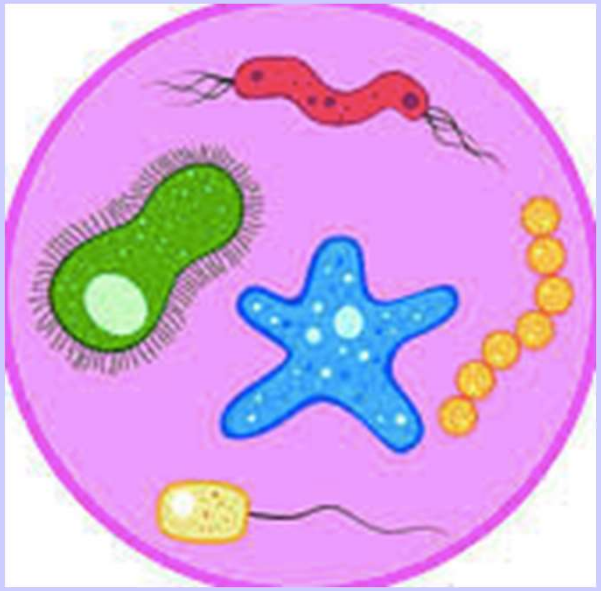
Immunity

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



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

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

- ❑ 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.

Microbes Added Value Project (AVU)

What do you know about **antibiotics**? Do you know what they are used to treat?

Microbes Added Value Project (AVU)

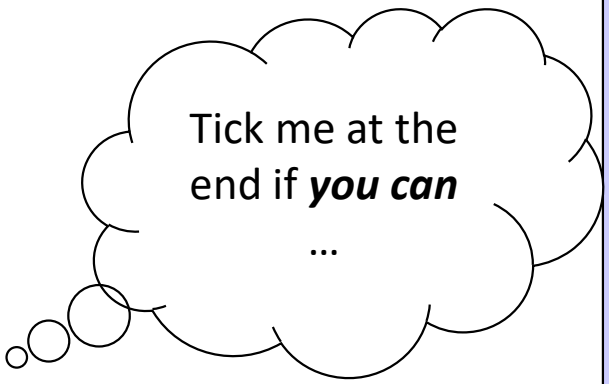
24/09/2024

Learning Intentions:

- To take part in a project that investigates what antibiotics are and how they affect society.

Success Criteria

- ❑ I can research what antibiotics are
- ❑I can describe what antibiotics are used to treat
- ❑I can discuss the problems that antibiotics cause

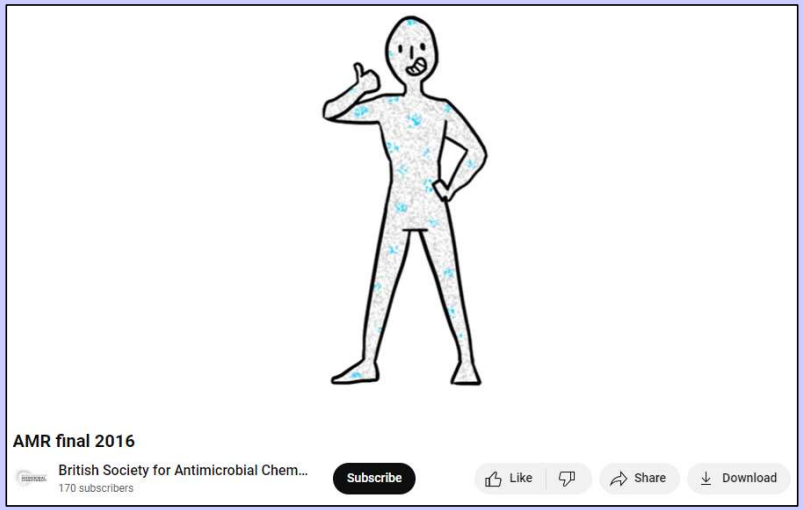


Microbes Added Value Project

- An added value project is your chance to learn about a real life problem.
- You can use your **Science knowledge** to describe what the problem is.
- You can use your **Research skills** to describe what effect the problem has on society or the environment

Intro video

https://www.youtube.com/watch?v=cXItjas0yYw (6 mins 45)

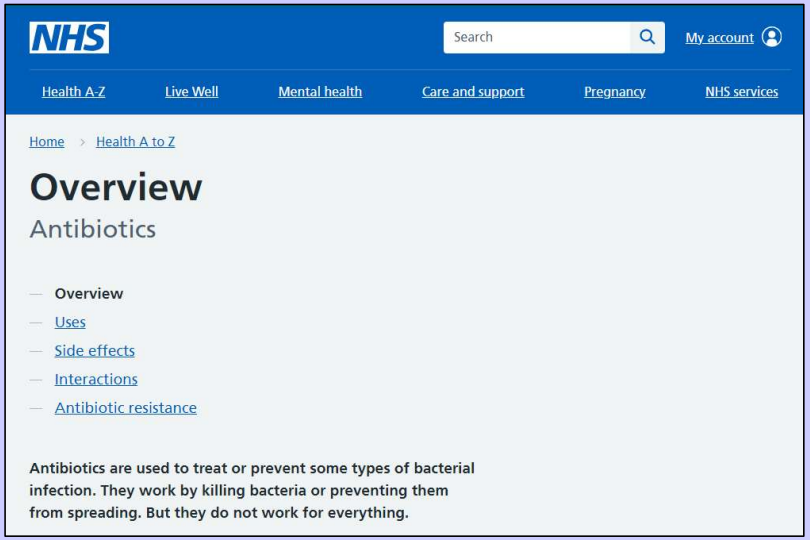


What are antibiotics?

Antibiotics are used to treat or prevent some types of bacterial infection. They work by killing bacteria or preventing them from reproducing and spreading.

But they don’t work for everything. When it comes to antibiotics, take your doctor’s advice.

https://www.nhs.uk/conditions/antibiotics/



What do antibiotics treat?

Watch the two short clips:

- What is the general message from the videos?
- What do antibiotics fight?
- What do antibiotics NOT fight?

https://www.youtube.com/watch?v=V-BL2tDINds

https://www.nhs.uk/Video/Pages/antibiotics-dont-work-for-everything.aspx

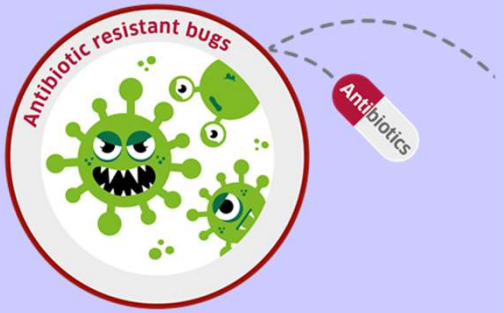
What is your focus?

The main question you are being asked to research is:

- **What are antibiotics and what affect do they have on society?**

If you want to push yourself, you can also research:

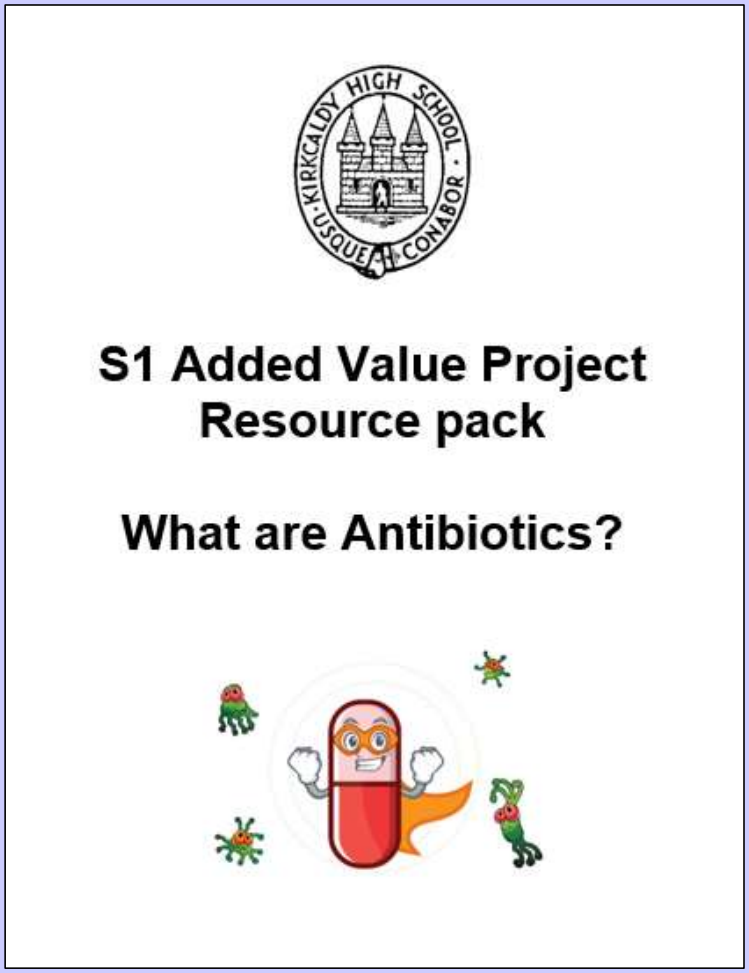
- **What happens when antibiotics don't work? What affect will this have on society?**



Resource Pack

- You will each get a copy of the resource pack. Which you should return at the end of each lesson.

- This will guide you through your first Science Added Value Project



Check List

- You will each get a copy of a checklist – this is yours to keep!
- This will guide you through your first Science Added Value Project

KIRKCALDY HIGH SCHOOL

Science Department

Name:	Class:

S1 ADDED VALUE PROJECT CHECKLIST

Title:	Date:

Task		Evidence Needed	✓ or x
1.1	Have you come up with an aim for your **antibiotic** project?	On your poster, have you got a clear aim for the topic you are investigating?	
		On your poster, have you said how **antibiotics** might affect society?	
1.2	Have you carried out your own research on **antibiotics**	On your poster, have you included information about **what antibiotics are** from a relevant source?	
1.3	Have you used your research to make a table, graph or diagram?	On your poster, have you made a neat table, graph or chart?	
		Have you described what your chart shows?	
1.4	What is the science behind **antibiotics**?	On your poster, have you made a conclusion about **antibiotics** and explained why it impacts on society?	
1.5	Have you presented your project well?	Is your project clear and presentable containing only information relevant to your aim?	

Useful Websites

Microbes: https://microbiologyonline.org/
Antibiotics: https://www.nhs.uk/conditions/antibiotics/
History of Antibiotics: https://microbiologysociety.org/education-outreach/antibiotics-unearthed/antibiotics-and-antibiotic-resistance/the-history-of-antibiotics.html
Antibiotic Resistance NHS: https://www.nhs.uk/conditions/antibiotics/antibiotic-antimicrobial-resistance/
Antibiotic Resistance World Health Organization: https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance
Antibiotics: BBC Bitesize: https://www.bbc.com/bitesize/guides/zyxg7p3/revision/7
Antibiotic Resistance BBC Bitesize: https://www.bbc.com/bitesize/guides/zyxg7p3/revision/8
Kiddle encyclopedia: https://kids.kiddle.co/Antibiotics

What do I need to do?

- Your project will have two parts:
- Research stage – this is where you think about the **aim** of your project.
- Presentation/Reporting stage – this is where you bring together all your research to make a presentation (this could be a poster or powerpoint or podcast for example)

Research stage

- Aim: Make an aim (What will your project show?)
- Basic research: What are antibiotics?
- Detailed research: You may use evidence to show what effects antibiotics have on society.

Presentation/Reporting stage

- Use your research to make a poster
- If you want to present your research in a different way, ask your teacher
- Use your checklist to make sure you have included everything

Aim

Background information

- You may conduct your own internet research or select information from the pack your teacher gives you.
- Being able to research a topic is an important skill for a Scientist. An easy way to plan your research is to come up with some questions that are relevant to your topic. You should use your aim to plan how you will research your topic.

For example, if your aim was…

“To find out the effect of antibiotics on society”

Your research might include questions like:

1. What are antibiotics?
2. What do antibiotics do?
3. When/how were antibiotics discovered?
4. What effects do antibiotics have on microbes?
5. What effects do antibiotics have on society*?

Background Research

Background Source 1: From BBC Bitesize:
https://www.bbc.com/bitesize/guides/zyxg7p3/revision/7

Antibiotics

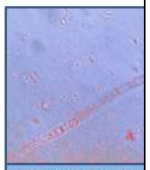
Antibiotics are substances that slow down or stop the growth of commonly prescribed medicines, examples include penicillin an can be taken to cure the diseases by killing the pathogens, but diseases and not viral ones.

Penicillin

Penicillin was the first antibiotic in 1928 by Alexander Fleming. bacteria he had left in a Petri dish had been killed by the natura Penicillium mould.

How do antibiotics work?

Antibiotics damage the bacterial cells by inhibiting their cellular processes, but do not damage the host cells. They have the ability to cure some bacterial diseases that would have previously killed many people. Since their introduction, they have had a large influence on the world's health and death rate.



A bacterial cell dam

Different bacteria cause different diseases. One antibiotic may only work against one type of bacteria, or a few types. This means that a range of different antibiotics is needed the whole range of bacterial diseases.

Viral diseases

Viral diseases cannot be cured by antibiotics, as they reproduce It is very difficult to develop antiviral drugs, as they might damag killing the virus. Antiviral drugs only slow down viral developmer change their antigens quickly which means new drugs have to b regularly.

Background Source 2: From BBC Bitesize:
https://www.bbc.com/bitesize/guides/zyxg7p3/revision/8

Antibiotic resistance

Since Penicillin was discovered in 1928, the use of antibiotics for the treatment of diseases has increased exponentially. Antibiotics are being overused in many ways in our world today.

Problems with antibiotics

Commonly prescribed antibiotics are becoming less effective due reasons:

- over use of antibiotics
- failing to complete the fully prescribed course by a doctor
- use of antibiotics in farming

These can lead to the effectiveness of antibiotics being reduced, of antibiotic resistance increasing. These bacteria are commonly superbugs.

Over use

People feel unwell and when going to the doctors, they expect an prescribed. If patients have viral infections, such as the common bacterial one, the antibiotics are ineffective and unnecessary.

Failing to complete the course

Patients should always fully complete the prescribed course of an they are taken. This ensures all bacteria are killed, and so none s subsequently mutate and produce resistant strains. Some patient after a few days of taking the medicine, and stop taking them. Thi harmful, as random mutations can occur which can lead to antibi resistant bacteria reproduce quickly, and the resistance spreads.

Agricultural use

Previously, antibiotics were regularly used in farming, and these prevent disease, keep the animals well and allow them to grow q in agriculture may have a cost, as it could lead to spread of antibi animals into human hosts. Legal controls are now in place to try a of antibiotics in this way.

Background Source 3: From World Health Organization:
https://www.who.int/en/news-room/fact-sheets/detail/antibiotic-resistance

KEY FACTS

- Antibiotic resistance is one of the biggest threats to global health, food security, and development today.
- Antibiotic resistance can affect anyone, of any age, in any country.
- Antibiotic resistance occurs naturally, but misuse of antibiotics in humans and animals is accelerating the process.
- A growing number of infections – such as pneumonia, tuberculosis, gonorrhoea, and salmonellosis – are becoming harder to treat as the antibiotics used to treat them become less effective.
- Antibiotic resistance leads to longer hospital stays, higher medical costs and

Antibiotics are medicines used to prevent and treat bacterial infections. Antibiotic resistance occurs when bacteria change in response to the use of these medicines.

Bacteria, not humans or animals, become antibiotic-resistant. These bacteria may infect humans and animals, and the infections they cause are harder to treat than those caused by non-resistant bacteria.

Antibiotic resistance leads to higher medical costs, prolonged hospital stays, and increased mortality.

The world urgently needs to change the way it prescribes and uses antibiotics. Even if new medicines are developed, without behaviour change, antibiotic resistance will remain a major threat. Behaviour changes must also include actions to reduce the spread of infections through vaccination, hand washing, practising safer sex, and good food hygiene.

PROBLEM

Antibiotic resistance is rising to dangerously high levels in all parts of the world. New resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases. A growing list of infections – such as pneumonia, tuberculosis, blood poisoning, gonorrhoea, and foodborne diseases –

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S1 Added Value Project Resource pack

What are Antibiotics?

Find me in here on pages 3-6

Results from research

You now have to use your research to make a table, graph or diagram.
You must described what your chart shows!

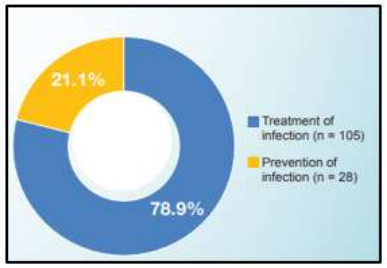
Sources for additional information/data

You are going to carry out **research** on use of antibiotics. The sources below can be used to make a table, graph, chart, summary or diagram that is relevant to your aim.

Data Source 1: From NHS Health Prevention Scotland:
adapted from https://hpspubsrepo.blob.core.windows.net/hps-website/nss/2647/documents/2_SONAAR-appendix-2017.xlsx

Use of antibiotics in Scotland, doses per 1 000 people in Scotland per day				
Year				
2013	2014	2015	2016	2017
26.33	*26.42*	*26.25*	*25.86*	*25.54*

Data Source 2: From NHS Scotland:
adapted from https://hpspubsrepo.blob.core.windows.net/hps-website/nss/2384/documents/1_HALT_report-2018-



Use of Antibiotics in Scottish Hospitals* in 2018

Data Source 3: From European Centre for Disease Prevention and Control:
adapted from AER report 2017 https://ecdc.europa.eu/sites/portal/files/documents/ESAC-NET-report-2017-AER.pdf

Use of antibiotics in the community, doses per 1 000 people in population per day					
Country	Year				
	2013	2014	2015	2016	2017
EU	*22.3*	*21.9*	*22.4*	*22.8*	*21.8*

Data Source 4: From Health Protection Scotland
https://hpspubsrepo.blob.core.windows.net/hps-website/nss/2709/documents/1_annual-summary-salmonella-2018-12022019.pdf

Rates of Salmonella infection per 100,000 people in Scotland

NHS board	Rate in 2018	Rate in 2017
Ayrshire & Arran	17.0	18.4
Borders	14.8	14.0
Dumfries & Galloway	12.0	20.1
Fife	12.4	13.2
Forth Valley	14.8	14.8
Grampian	14.8	16.7
Greater Glasgow & Clyde	13.0	15.8
Highland	10.3	7.1
Lanarkshire	14.8	18.3
Lothian	14.3	15.9
Orkney	13.7	0.0
Shetland	17.2	8.6
Tayside	14.2	14.0
Western Isles	7.4	18.6
Scotland	**13.9**	**15.5**

Data Source 5: From The Lancet
Adapted: https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(18)30605-4/fulltext#section-3d6acba1-aeea-4be2-8dc9-b7e14e5b6583

People with Antibiotic Resistant infection in Europe in 2007 and 2015	
Year	
2007	2015
*239238**	*602609**

**You may want to round these numbers. Ask your teacher for help*

Data Source 6: From The Lancet
Adapted: https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(18)30605-4/fulltext#section-3d6acba1-aeea-4be2-8dc9-b7e14e5b6583

Deaths caused by Antibiotic Resistant infection in Europe in 2007 and 2015	
Year	
2007	2015
*11144**	*27249**

**You may want to round these numbers. Ask your teacher for help*

S1 Added Value Project Resource pack

What are Antibiotics?

Find me in here on pages 7-8

Conclusion

Conclusion:

What has your research found out?

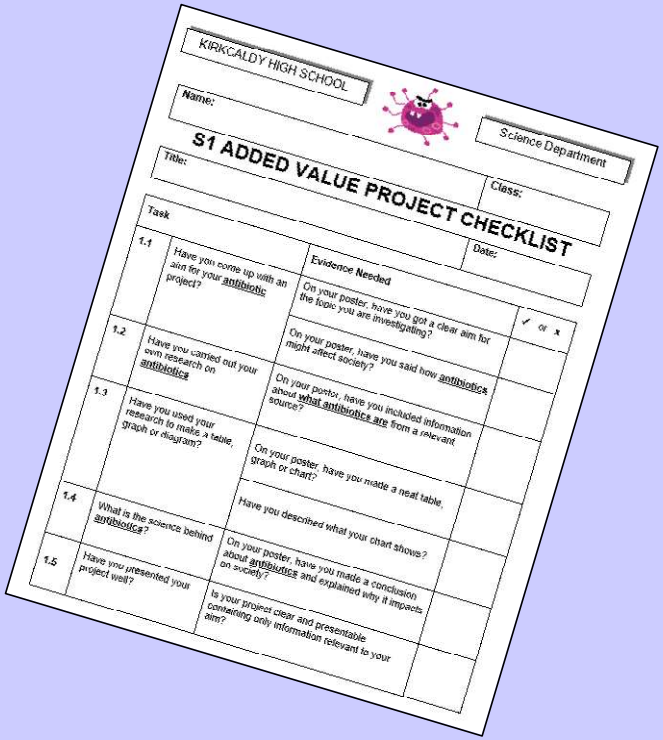
You must now make a conclusion:

- What is the science behind **antibiotics**?
- Have you explained how antibiotics impact society?

Presentation:

You will also achieve marks if you have presented your project well.

- Is your project is clear and presentable, containing only information relevant to your aim?



KIRKCALDY HIGH SCHOOL

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Title

Aim: *The aim of this project is to show the effect of..... on.....*

Background Information:
Antibiotics are.....
.....
.....
.....
.....
.....
.....

I carried out a **questionnaire** asking "....."

The results were.....

	Response	
	Yes	No
Question	10	5
Question	8	7

My questionnaire shows.....

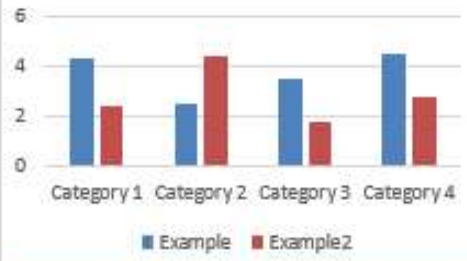
I carried out an **experiment**:

The results were.....

	Response	
	Yes	No
Question	10	5
Question	8	7

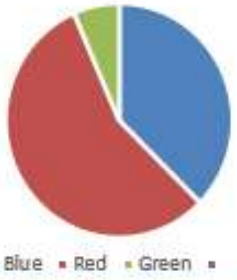
My results show.....

Example: Bar Chart



I used my **research** to make a bar graph. It shows.....

Example: Pie Chart



I used my **research** to make a Pie Chart. It shows.....

Conclusion:
I have found out that.....
.....
.....
.....