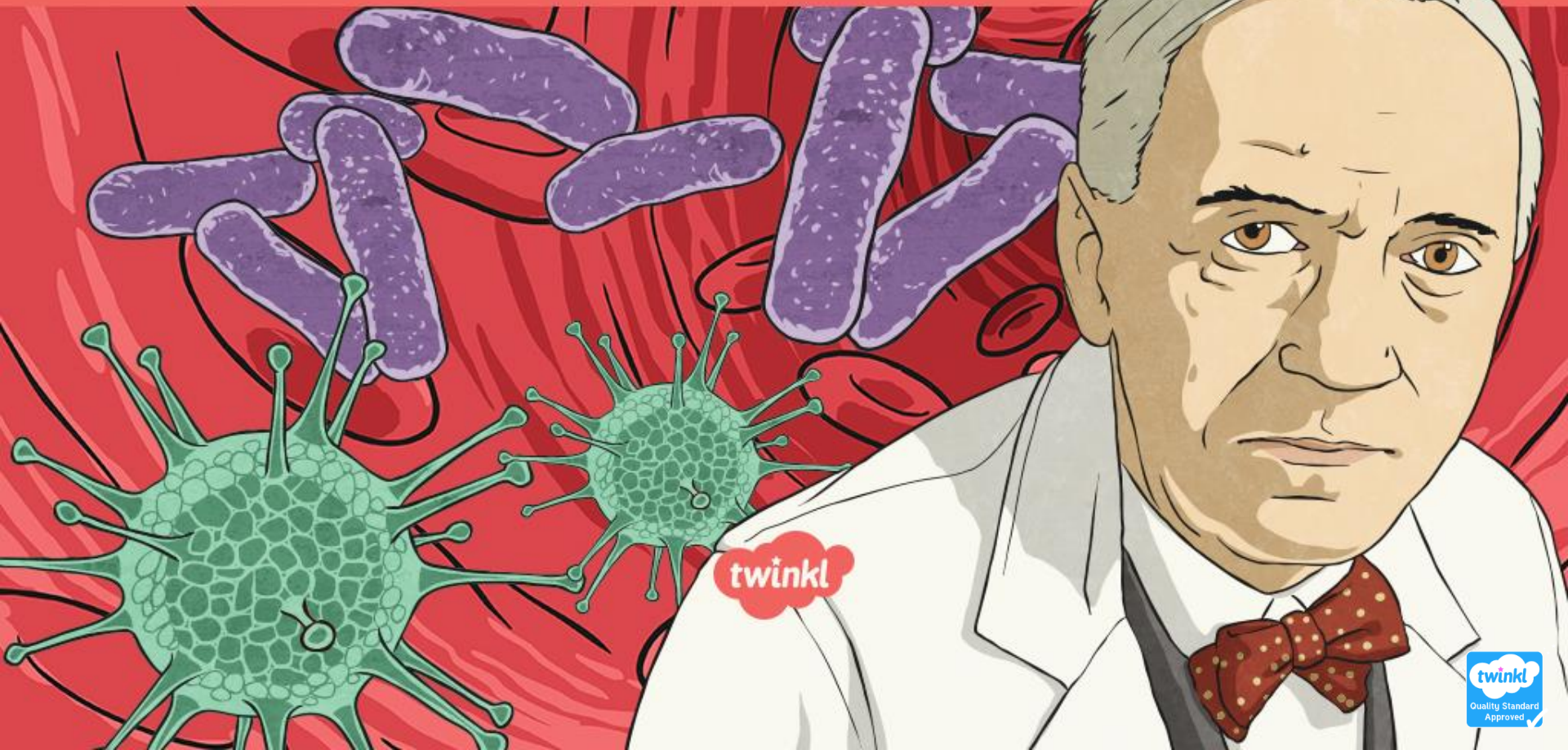
Alexander Fleming

Scientists and Inventors



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Aim

- To record and interpret data on the effects of penicillin using a scatter graph.

Success Criteria

- I can describe Fleming's discovery of penicillin.
- I can construct a scatter graph from a table of results.
- I can answer questions about the effects of penicillin using my scatter graph.

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Treating Illnesses

Some illnesses are caused by microorganisms. Which of the conditions below are caused by microorganisms such as bacteria, fungi or viruses?

See next slide for answers

- Chicken pox
- Nose bleed
- Ear infection
- Impetigo
- Broken leg
- Tonsillitis
- Athlete's foot
- Salmonella

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Answers

Some illnesses are caused by microorganisms. Which of the conditions below are caused by microorganisms such as bacteria, fungi or viruses?

Green = caused by a microorganism
Purple = not caused by a microorganism

- Chicken pox
- Nose bleed
- Ear infection
- Impetigo
- Broken leg
- Tonsillitis
- Athlete's foot
- Salmonella

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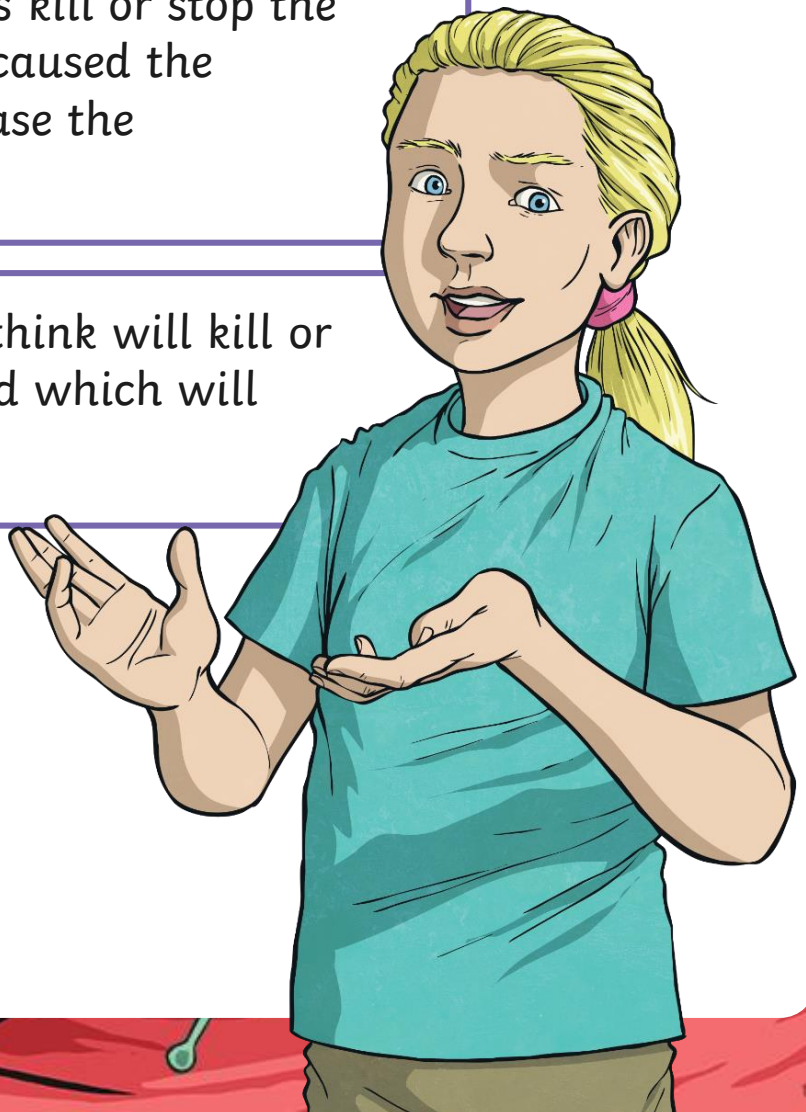
Treating Illnesses

There are different ways to treat illnesses caused by microorganisms. Some of the medicines kill or stop the growth of the bacteria or fungus that caused the illness, whereas other medicines just ease the symptoms of the illness.

Which of the medicines below do you think will kill or stop the growth of microorganisms and which will treat the illnesses caused?

- Paracetamol
- Antiseptics
- Antibiotics
- Cough medicine



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Treating Illnesses

Which of the medicines below do you think will kill or stop the growth of microorganisms and which will treat the illnesses caused?

Treat the illness caused by microorganisms:

- Paracetamol
- Cough medicine

Kill or stop the group of microorganisms:

- Antibiotics
- Antiseptics

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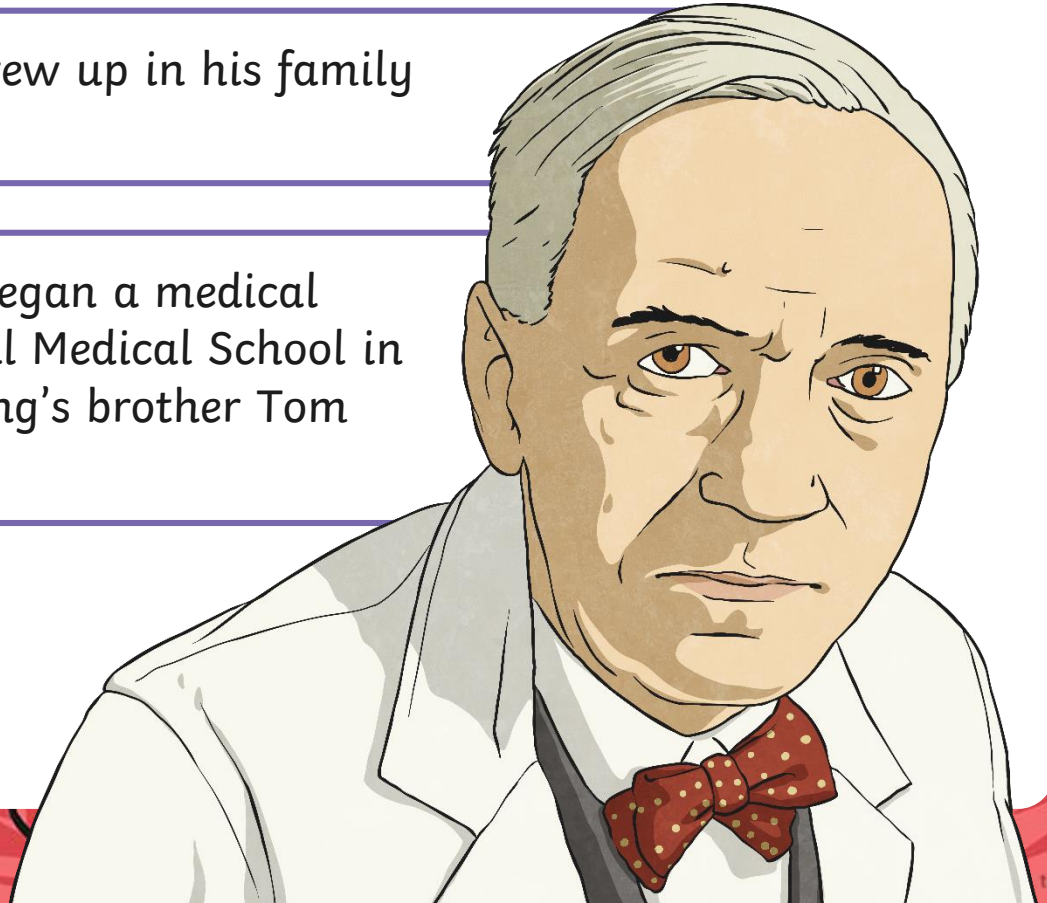
Alexander Fleming

- Alexander Fleming was a Scottish scientist who made an important breakthrough in the treatment of illnesses caused by bacteria.

- He was born in 1881 and grew up in his family home in Scotland.

- At the age of 20, Fleming began a medical degree at St Mary's Hospital Medical School in Paddington, London. Fleming's brother Tom was also a doctor.



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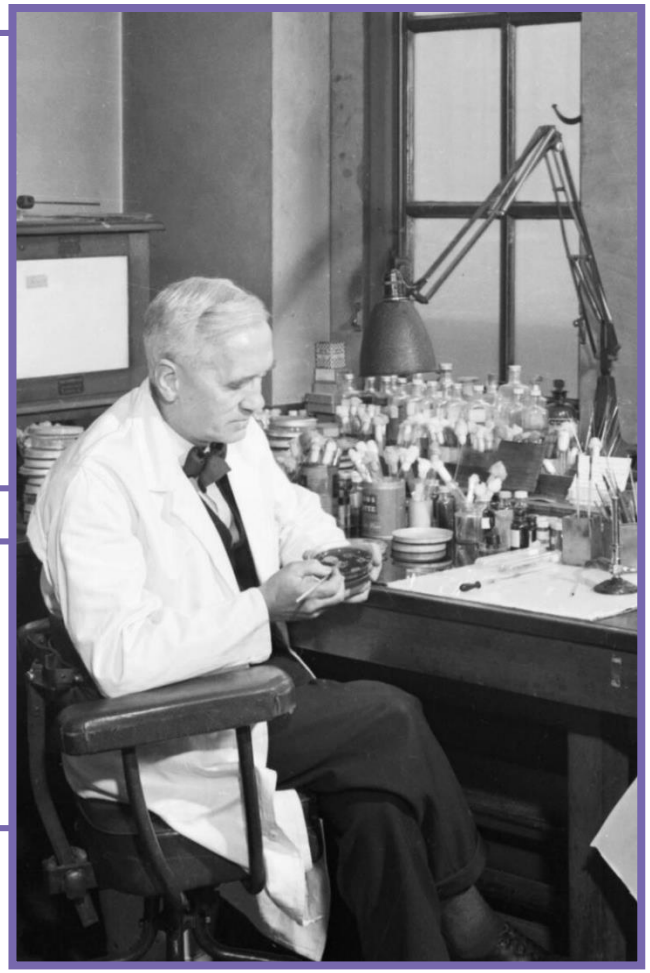
Alexander Fleming

During the First World War, Fleming served as a captain in the Royal Army Medical Corps. He worked in battlefield hospitals on the Western Front in France throughout the war. Fleming witnessed the deaths of many soldiers from infected wounds.

After the war, his experiences led him to begin investigations to find an antibacterial medicine that could treat infections.



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Fleming's Discovery

By 1928, Fleming had been investigating bacteria and antibacterials for several years. He had made some important discoveries, such as the discovery of lysozyme, an enzyme (chemical) in the human body that fights bacteria.

Unfortunately, though his name had become well known, he had not found anything that could be used to fight bacteria on a large scale.

This all changed in September 1928.

Listen carefully to the story of his discovery and think about what you feel is the most important moment.

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Fleming's Discovery

Fleming had been on holiday with his family for the whole of August. He was a brilliant scientist, but was known to be very untidy. He had not cleaned up his recent experiments with bacteria when he left for his holiday.

When he arrived back, he went to his lab to sort through his old investigations. He began to tidy up some Petri dishes in which he had been growing bacteria.

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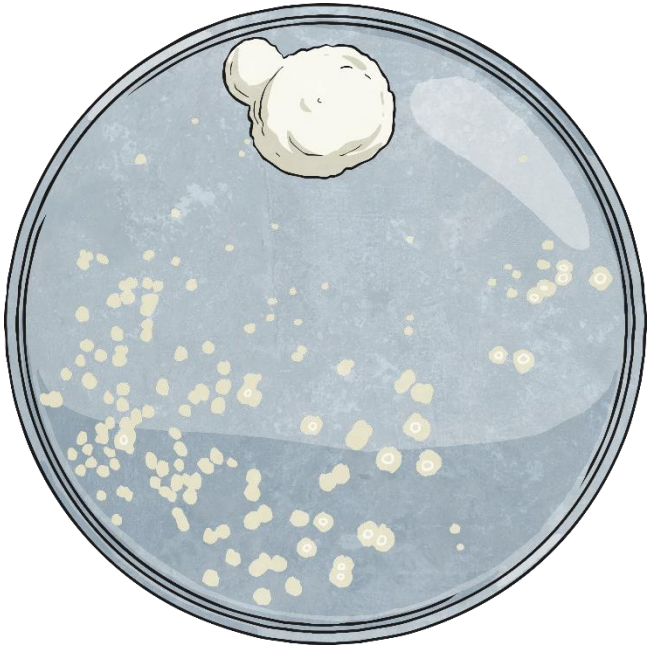
Fleming's Discovery

- He noticed that mould had grown in one of the Petri dishes. The colonies of bacteria around the mould had been destroyed, whereas the bacteria in other Petri dishes were still alive.

- Fleming showed his discovery to his assistant, who agreed that it was unusual.



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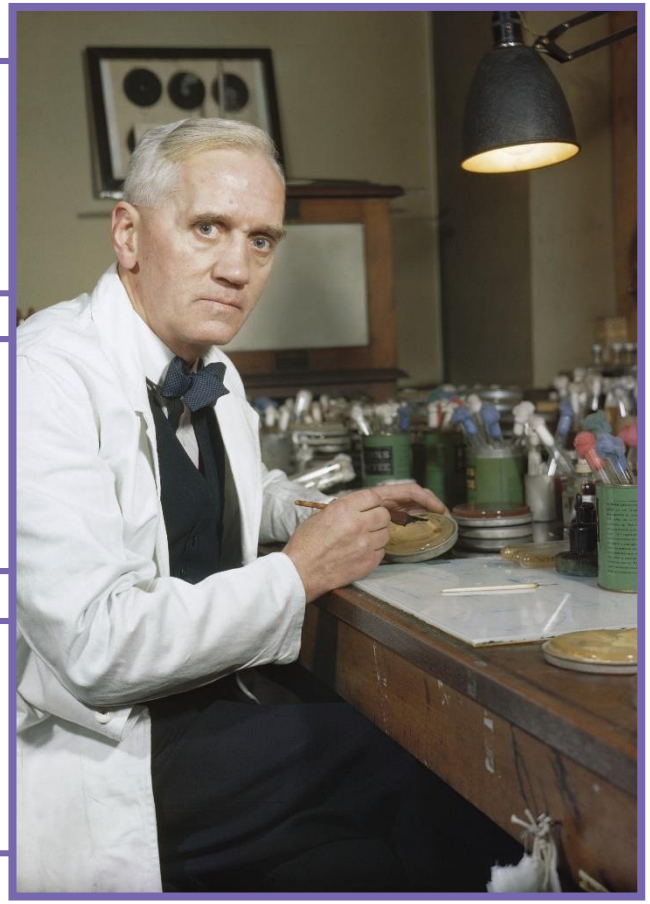
Fleming's Discovery

- Fleming grew the mould in another Petri dish and found that it killed several types of disease-causing bacteria.
- He originally called his discovery 'mould juice', but in March 1929 he officially named the substance ‘penicillin’.
- Fleming had discovered the world's first antibiotic that could be used to treat illnesses caused by bacteria.



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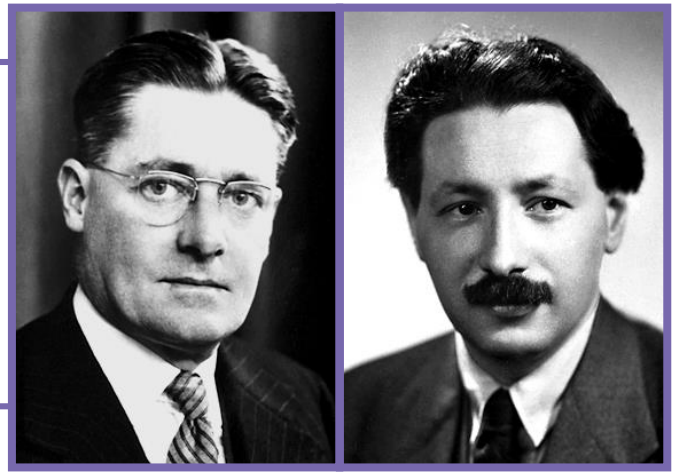
Fleming's Discovery

- Two other scientists called Howard Florey and Ernst Boris Chain then built on Fleming's discovery to mass-produce penicillin in order to treat the wounded soldiers of the Second World War.



- Fleming, Florey and Chain were awarded the Nobel Prize for their work in 1945.

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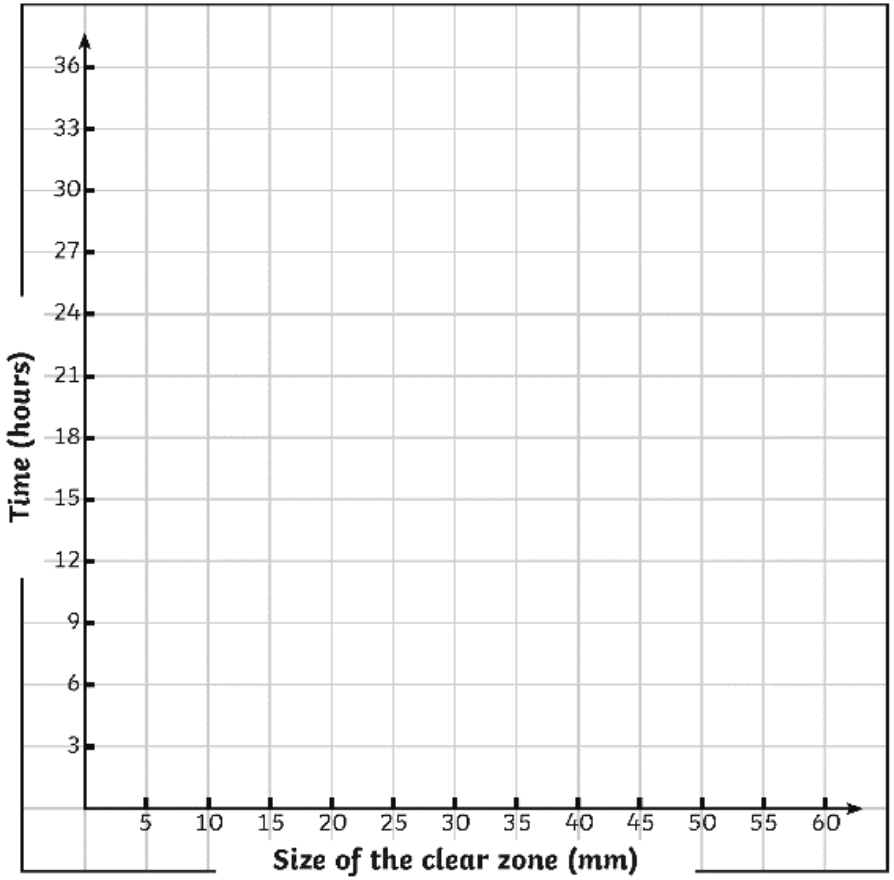
Your Task - Part 1

Construct a scatter graph using the information on the 'Penicillin Effects' worksheet as a template. Once you have constructed your graph, answer the questions about the effects of penicillin on bacteria.

Scatter graphs are used to compare the correlation (relationship) between 2 sets of data. This table shows the results of an experiment in which a penicillin disc was placed in 3 different bacteria colonies, each colony measuring 100 mm in diameter. As the penicillin discs kill the bacteria, a clear zone emerges around each disc. The diameter of the clear zones around the penicillin discs was measured every 3 hours.

Create a scatter graph using the results in the table to see if there is a correlation between the time the bacteria was exposed to the penicillin and the size of the clear zone around the penicillin.

Time	Size of the clear zone (mm)			Time	Size of the clear zone (mm)		
3 hours	0	0	5	21 hours	29	30	35
6 hours	6	4	8	24 hours	36	34	39
9 hours	10	9	13	27 hours	41	40	44
12 hours	15	12	17	30 hours	49	45	50
15 hours	21	20	24	33 hours	53	49	57
18 hours	25	28	31	36 hours	60	53	64



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Your Task – Part 2

Once you have constructed your graph, answer the questions about the effects of penicillin on bacteria.

Answer these questions about your graph.

1. Which of these conclusions is supported by the graph?

   Penicillin kills all bacteria.

   The longer bacteria is exposed to penicillin, the more of it dies off.

   Penicillin kills most bacteria in the first 12 hours.

   It takes 36 hours for penicillin to kill bacteria.

2. How long do you predict it would take for the penicillin to kill all the bacteria in the colony? Remember, the original bacteria colony measured 100 mm.

_____

_____

_____

_____

3. Describe the effect of penicillin on bacteria using the results shown in your graph.

_____

_____

_____

_____

You may want to use these words in your answer:

pencillin	kills	bacteria	time	more

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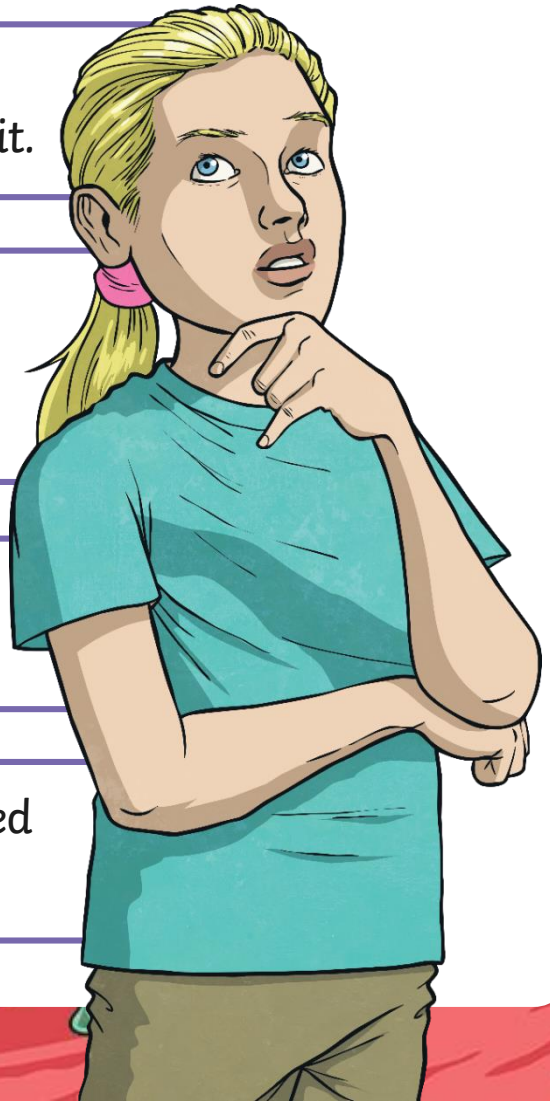
Final Thought - Antibiotic Resistance

- Penicillin has been used to treat illnesses caused by bacteria ever since Alexander Fleming first discovered it.
- However, some types of bacteria can become resistant to antibiotics like penicillin. This means the antibiotics no longer affect them.
- What are the potential implications of antibiotic resistance?
- What do scientists need to do to prepare for increased antibiotic resistance?



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