NUI Galway
OÉ Gaillimh
School of Natural Sciences

Battling Bacteria:

John Doe's Antibiotic Story

ACTIVITY BOOK

NAME: _____

TEACHER: _____

AGE: _____

I AM A: BOY ☐ GIRL ☐

SFI Discover
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Chapter 1: Say Hello to John Doe

John is a 30 year old from Moycullen in Galway. He works as a gardener but loves to play football in his spare time.

John woke up this morning and didn't feel 100%. He had, as he described, a throbbing in his throat that no amount of pain killers would reduce.

Chapter 2: Going to see the Doctor

John decided that the best thing to do would be to visit his local GP. On visiting the GP he told the doctor how he was feeling.

ACTIVITY 1– MICROBE MATCH

You are Trainee Doctors

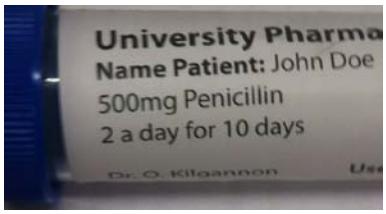
The doctor is very busy with patients. Help the doctor by figuring out each illness, what microorganisms are causing each illness and how to treat each one. Use your microbe cards, treatment table & list of illnesses to help.

INSERT TABLE HERE

The doctor explained to John that the infection he had was caused by a microorganism called _____, a bacteria which normally lives on human skin. The doctor said to John that he needed a special medicine called an _____ which is used to treat only bacterial infections. He gave John a prescription with ‘penicillin’ written on it and told him to go to the pharmacy.

Chapter 3: Penicillin and the Cell Wall

When John went to the pharmacy, the pharmacist gave him a bottle containing penicillin tablets and explained to John the instructions on the bottle - he needed to take two tablets a day for ten days in order to kill all the bacteria and make him feel better. John was interested in how the penicillin killed the bacteria. Listen to the pharmacist as she explains how penicillin kills bacteria!

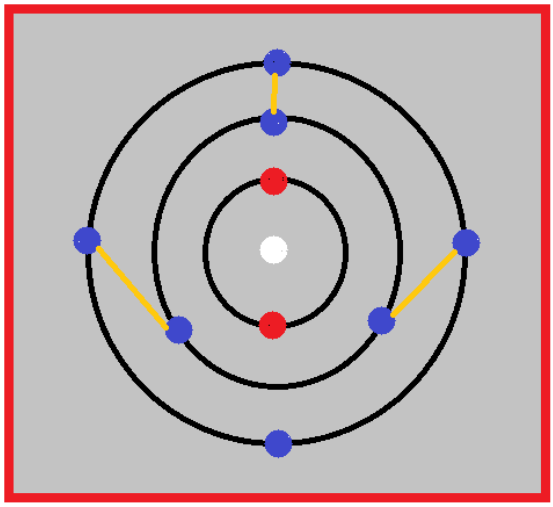


ACTIVITY 2 – BREAK THE BACTERIA

You are Pharmacy Assistants

Use the coloured bibs provided to form the structure of the bacteria causing John's infection according to the picture below.

Cell Wall Sugar

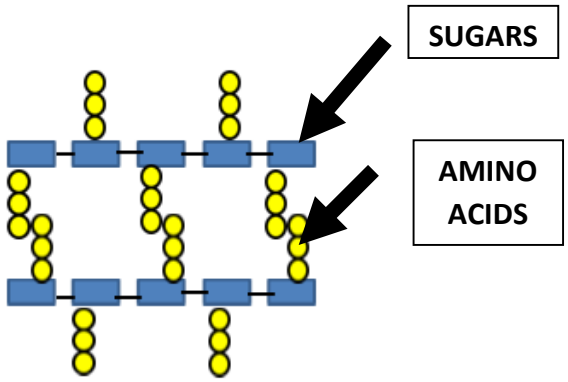


Cytoplasm

Cell Membrane

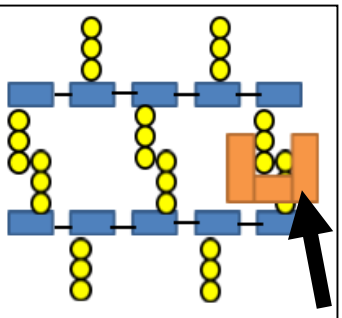
Amino Acids

HOW DOES PENICILLIN WORK?



STEP 1: How do bacteria make their cell wall?

The same as a builder make a brick wall – first he lays his bricks and then he puts cement on top of them. Bacteria make their cell walls the exact same. First they have a layer of sugars and they join these layers using amino acids.

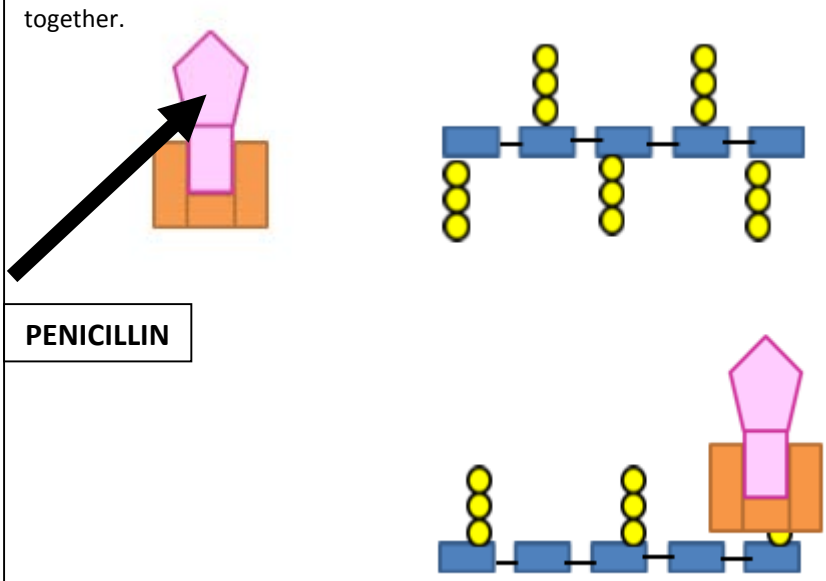


STEP 2: Joining the layers together

Bacteria use this extra tool to stick the amino acids together – like a stapler.

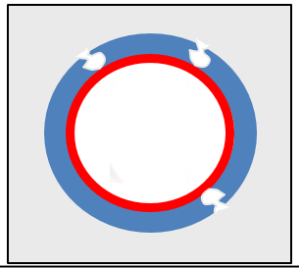
STEP 3: How Penicillin cracks the cell wall

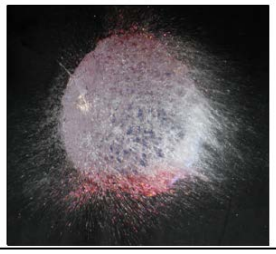
Penicillin sticks to this tool and prevents it from sticking the amino acids together.



STEP 4: Cell Bursts

Cracks start to form in the cell wall.
The bacteria cells burst.

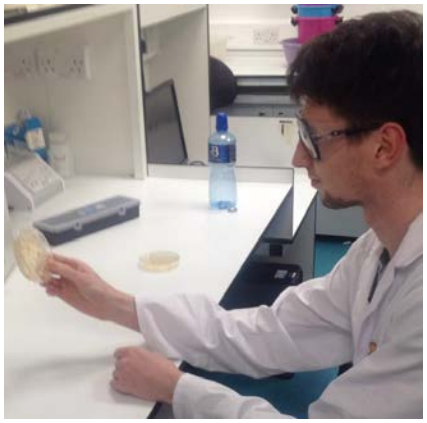




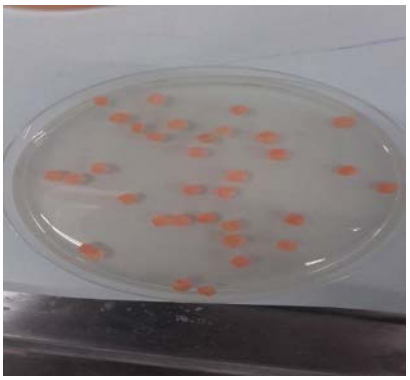
Chapter 4: Still not Well

After 3 days of taking his antibiotics John felt so much better. He decided that he didn't need to keep taking the antibiotic. But this good feeling didn't last. Within a week John was back at the doctor with the same symptoms and so the doctor once again prescribed John with penicillin. This time John made sure he took the antibiotics twice a day for ten days but when the antibiotics were all used up John still didn't feel better and, for the third time that month, found himself in the waiting area of his GP. This time the doctor took swabs of John's throat and sent it off to the microbiology lab in the hospital. The doctor told John it would take a couple of days for the results to come back...

Chapter 5: Resistance



Down in the lab, the microbiologists mixed the penicillin with a jelly-like substance called agar. When the agar turned solid, the microbiologists used the swab that was taken from John Doe's throat and spread the plates. The plates were then stored for 48hrs to allow the bacteria to grow.



By spreading the plates we can see if the bacteria are resistant to an antibiotic—they will grow on the agar containing that antibiotic and so that antibiotic cannot be used to fight that infection. If the plates contain lots of colonies it means that

the antibiotic can't kill the bacteria and so the bacteria are resistant. The plates which contain **<10 colonies of bacteria** indicate that the bacteria that was spread has been killed off or nearly all killed off by the antibiotic.

ACTIVITY 3 – COUNT THE COLONIES

You will be Microbiologists in the Lab

Analysing Plates

Microbiologist study plates of bacteria almost every day in the lab. It is a very important part of microbiology. Remember the gel found on in the plate is known as AGAR. AGAR provides the nutrients for the bacteria to grow. When studying plates to see if bacteria are resistant to an antibiotic the antibiotic is also added with the agar.

Bacteria grow on plates in colonies. A colony can be seen as a circle on the plate. A colony contains over 100,000 bacteria grouped together. When analysing plates to check for resistance lots of bacteria growing on the plate shows resistance. This is because the antibiotic is not killing the bacteria and they can grow easily on the plate. If there is very little or no colonies on the plate then the antibiotic is working and the bacteria are being killed by the antibiotic.

DISH NO.	No. of Bacterial colonies growing on the penicillin antibiotic?	Is this bacteria resistant to the penicillin antibiotic?	Will this person still feel sick after being given penicillin to treat their illness?
1.			
2.			
3.			
4.			
5.			
6.			

The bacteria in John Doe's sample are resistant/non-resistant to the antibiotic penicillin. How do we know this?

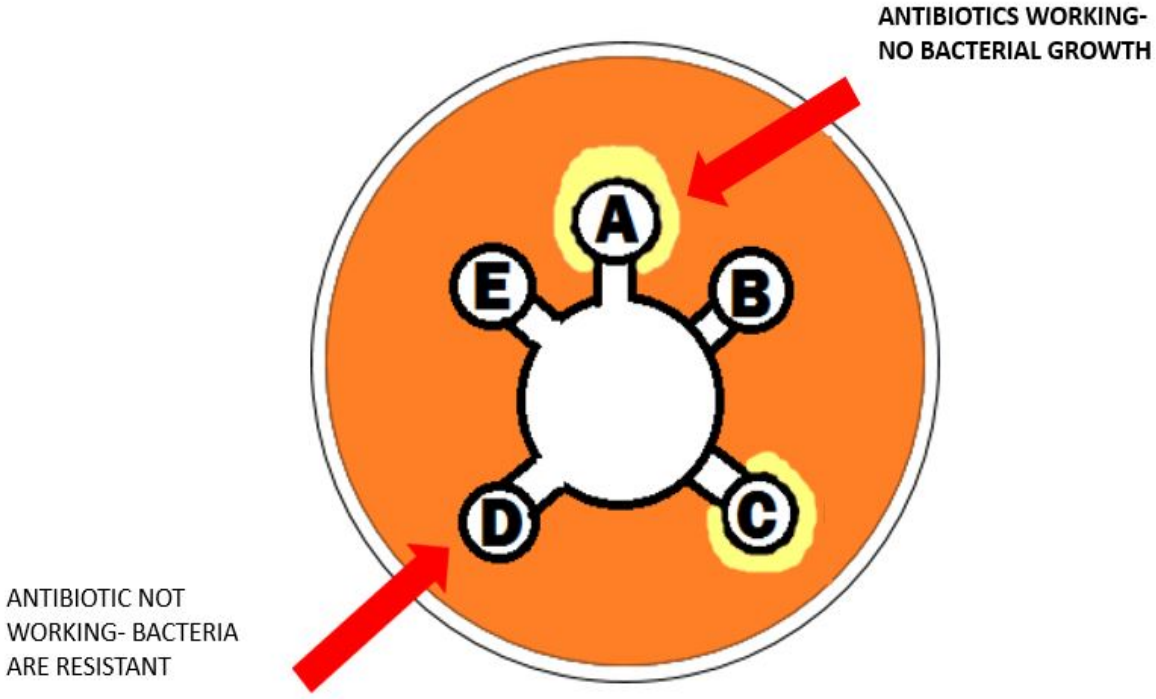
_____

_____

An antibiotic disc is a tool used by microbiologists to examine the resistance of a bacteria against a number of antibiotics. If the bacteria is resistant, it will grow around the disc. If the antibiotic works, the bacteria will not grow around the disc. Which antibiotic will we tell the doctor to give John next?

_____

_____



Chapter 6: Prevention of Antibiotic Resistance

John returns to the clinic and brings his medicine box from home. You are the doctors. Help John sort out his medicine box so that only the antibiotics which don't have the potential to cause antibiotic resistance are left

ACTIVITY 4– SORT THE MEDICINE BOX

You will be Trainee Doctors

There are 6 tubes of antibiotics in the medicine box. Work in a group to sort out the Medicine box into what is **safe** to use and what is **unsafe**. Place the **unsafe** products in the bin provided to be returned to the pharmacy and keep the safe products in the medicine box.

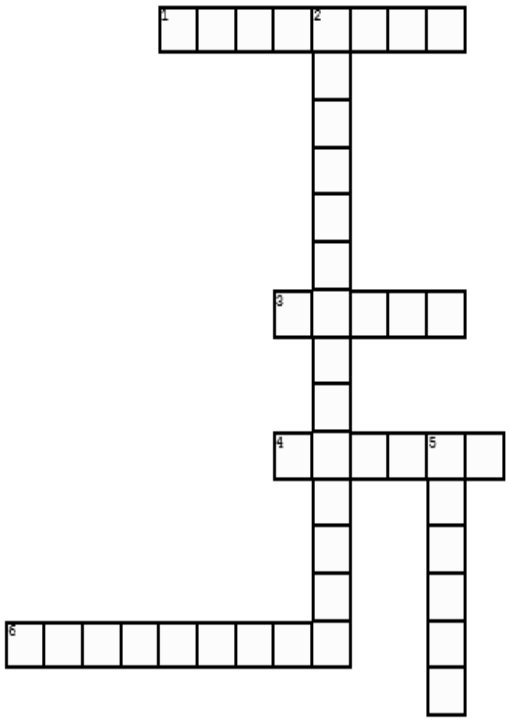
Note: There may be multiple reasons that the tubes are safe/unsafe. Please list **all the reasons** you think are relevant in the space provide on the table. **Write** if you are keeping (Yes)/not keeping(No) the tubes.

Tube No.	Yes/No	Reasons
1		1. 2. 3.
2		1. 2. 3.
3		1. 2. 3.
4		1. 2. 3.
5		1. 2. 3.
6		1. 2. 3.

Complete this crossword puzzle in your own time to test your knowledge on the rules of using antibiotics

Rules of Using Antibiotics

Complete the crossword below to help John Doe remember the Rules of Antibiotic's



Created on TheTeachersCorner.net Crossword Maker

Across

1. You buy your antibiotics here
3. Colds and flu's are caused by a ? infection
4. Who can you share antibiotics with
6. Taking Out of Date antibiotics are unsafe as they may cause bacteria to become ?

Down

2. Scientist who spreads plates and counts colonies
5. I am the only person who can safely prescribe antibiotics

Chapter 7: Fit and Healthy

John made sure he did everything the doctor told him and took all of his erythromycin antibiotics as directed on the pharmacy label. In no time John was feeling much better and was able to go back to work and most importantly back to football!

Crossword Puzzle Answers:

Across	Down
1. Pharmacy	2. Microbiologist
3. Viral	5. Doctor
4. Nobody	
6. Resistant	

Battling Bacteria Quiz!

Q1: Colds and Flu's are caused by which microorganism?

a) Bacteria
b) Virus
c) Fungus

Q2: Antibiotics only treat which type of microorganisms?

a) Bacteria
b) Fungi
c) Viruses

Q3: When bacteria are making their cell wall, what does penicillin target?

a) Cell wall sugars
b) Amino Acids
c) Stapler

Q4: Antibiotic Resistance is?

a) When a patient's bacteria are destroyed more easily by antibiotics because they have changed their shape.
b) When a patient's bacteria cannot be destroyed by an antibiotic because they have changed their shape
c) When a patient's body fights back against antibiotics not their bacteria.

Q5: Is it safe to share antibiotics with others?

a) Yes
b) No
c) Sometimes

Q6: Antibiotic Resistance is

a) Only a problem in hospitals
b) Doesn't affect young people
c) A worldwide problem

John Doe would like to <u>Thank You</u> for helping him Battle his Bacteria!!