

WITH  
Emmatheteachie

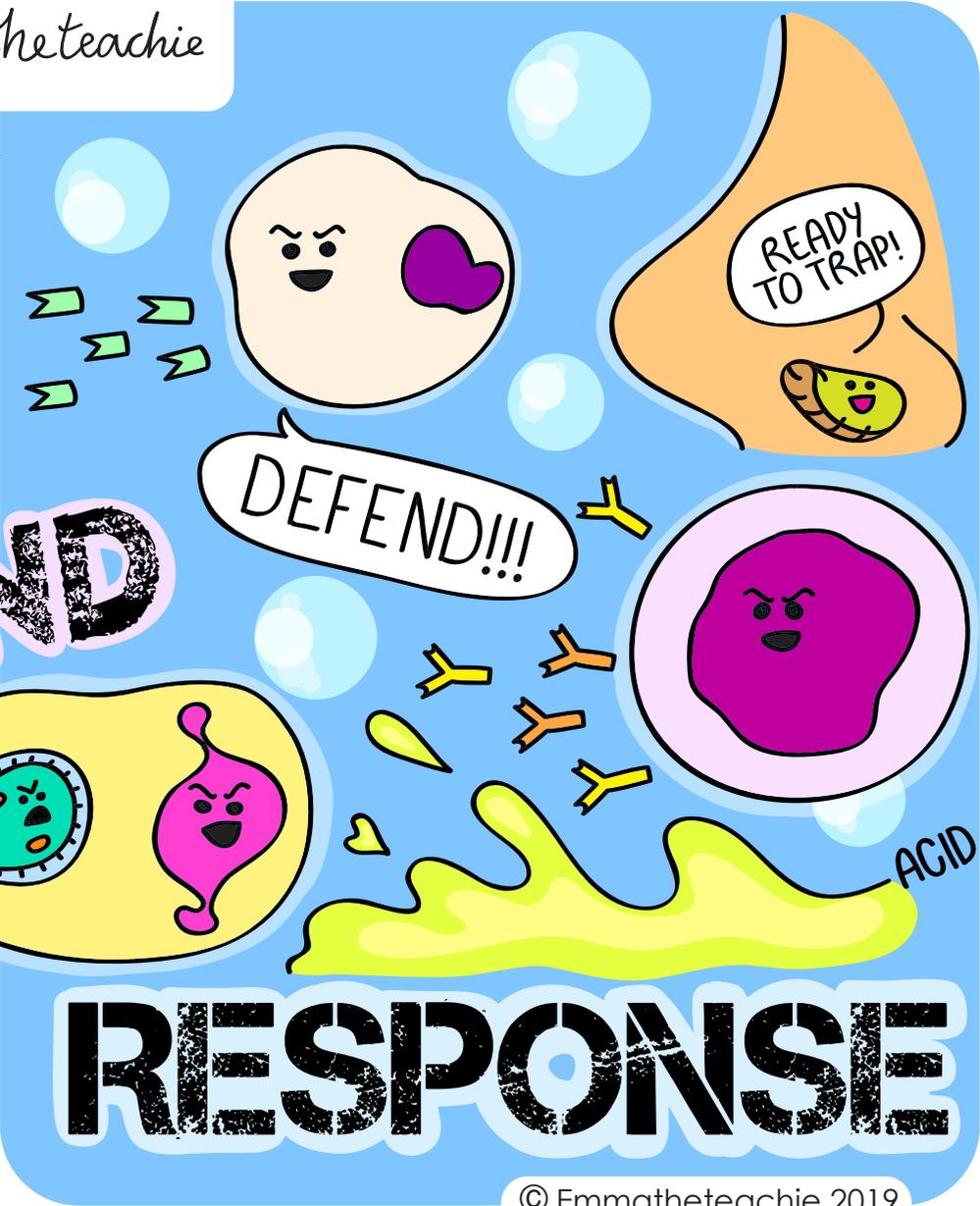
# INFECTION



ATTACK!!!

# AND

DEFEND!!!



# RESPONSE



# HOW TO STUDYALONG!

BIOLOGY TOPIC 3

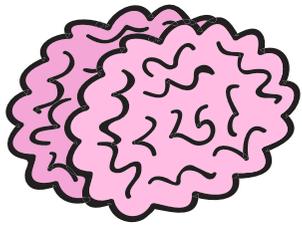
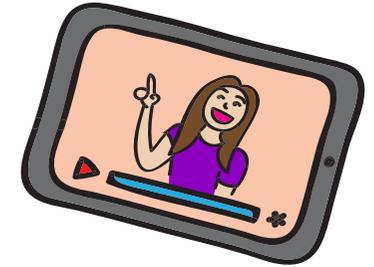


*Pick your style!*

Print the workbook in the style you want - colour or black & white! B&W is great for de-stressing colouring in & less ink!

*Studyalong with me!*

Complete the Studyalong tasks while watching my videos, pausing and replaying as much as you want!



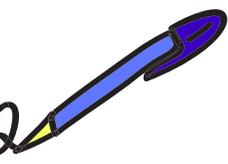
*Test your brain!*

Quick Questions give you the chance to see which bits you've nailed and which bits need another look over!

*Save your success!*

Track your learning with your very own progress tracker - super satisfying and useful for future revision sessions!



*Virus* 

*Examine and excel!*

30 exam-style questions to finish off the topic and let you practice your exam technique!

*Bonus break!*

Take a break and check out the bonus activity at the back for some fun or print a black & white cover page to colour in!



# YOUR PROGRESS TRACKER

## BIOLOGY TOPIC 3

**Colour** in the star that shows how you're doing for each topic!

MORE REVISION



ALMOST THERE



NAILED IT YEAH!



**Notes** - add these to help you in future revision sessions, e.g. learn how measles spreads!

Communicable diseases				
Viral diseases				
Bacterial diseases				
Fungal and protist diseases				
The immune system				
Vaccinations				
Antibiotics and painkillers				
The development and discovery of drugs				
Monoclonal antibodies				
Plant diseases				
Plant defences				

**BIOLOGY only**



# CONTENT AND VIDEOS

## BIOLOGY TOPIC 3



Scan the **QR code** using your phone or tablet camera (apple devices) or QR reader app (android devices) to load up the videos! Or visit the Emmatheteachie YouTube channel or website and select the "Infection and Response" playlist.



### COMMUNICABLE DISEASES



1-4

### VIRAL DISEASES



5-8

### BACTERIAL DISEASES



9-11

### FUNGAL AND PROTIST DISEASES



12-14

### THE IMMUNE SYSTEM



15-17

### VACCINATIONS



18-20

### ANTIBIOTICS AND PAINKILLERS



21-23

### DEVELOPMENT AND DISCOVERY OF DRUGS



24-27

### MONOCLONAL ANTIBODIES



28-31

### PLANT DISEASES



32-34

### PLANT DEFENCES



35-37

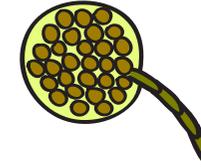
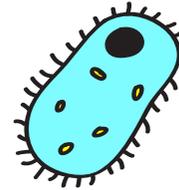
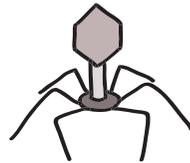
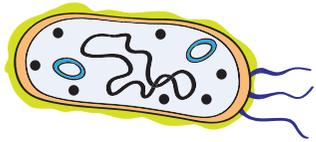
38-48 EXAM-STYLE QUESTIONS 49-54 ANSWERS

55-56 BONUS ACTIVITY (WOO!) 57 THANK YOU



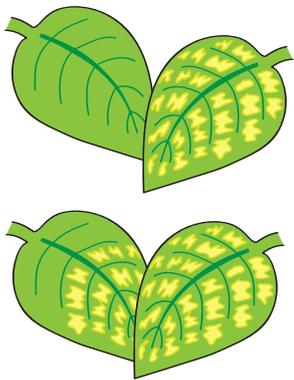
# COMMUNICABLE DISEASES

★ Define the keywords “communicable diseases” and “pathogens” & label the 4 groups of pathogens.



★ Name and describe the three methods by which pathogens can spread.

1



2

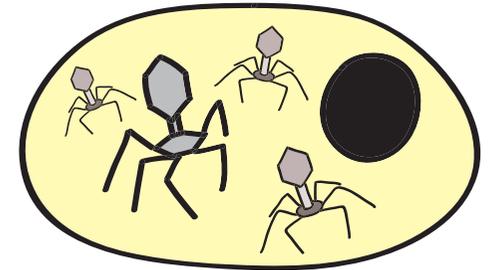
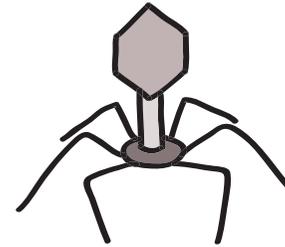
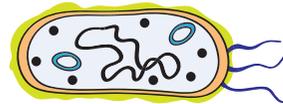
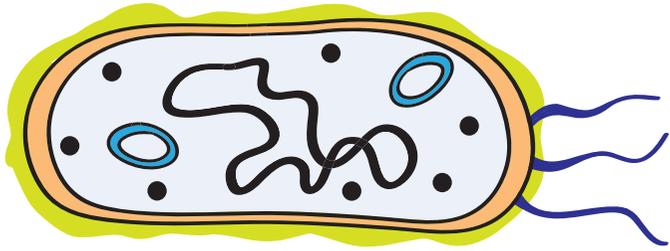


3



# COMMUNICABLE DISEASES

★ Describe the differences between bacteria and viruses and how these pathogens make us feel ill.



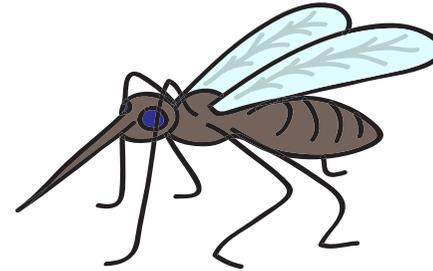
# COMMUNICABLE DISEASES

★ Describe the four methods that can be used to reduce the spread of communicable diseases.

1



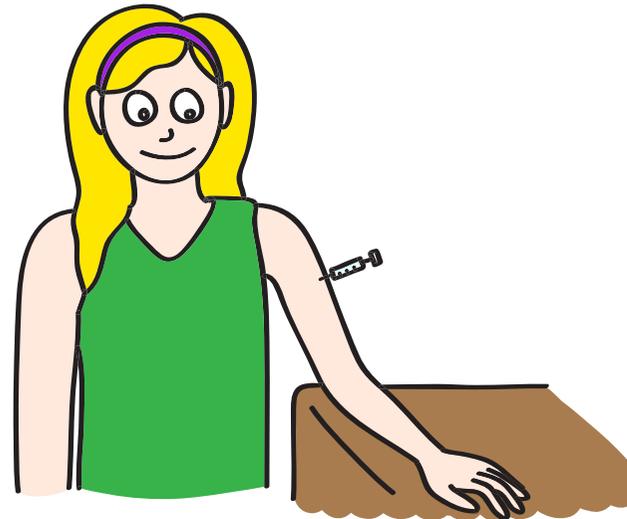
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3



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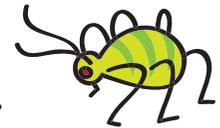


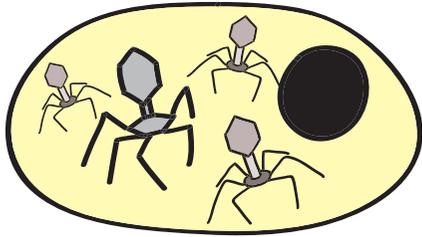
# COMMUNICABLE DISEASES

## BIOLOGY TOPIC 3

### << QUICK QUESTIONS >>

1. What is a pathogen?
2. Name the 4 groups of pathogens.
3. How do bacteria make us ill?
4. A farmer finds two of his plants have a disease caused by a fungus carried by aphids.  
Name two possible ways he could reduce the spread of this disease to the rest of his crops.





★ Describe why viral diseases are difficult to treat.

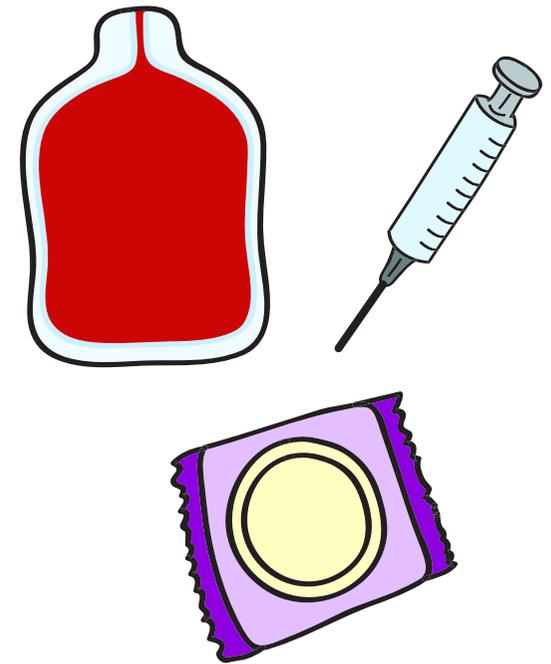
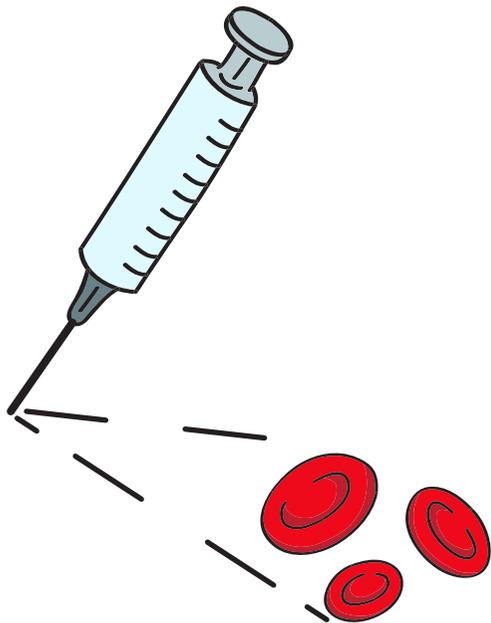
## MEASLES

★ Describe how measles can spread, its symptoms and how it is prevented and contained.



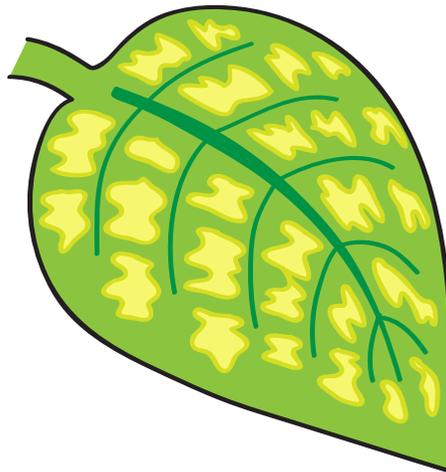
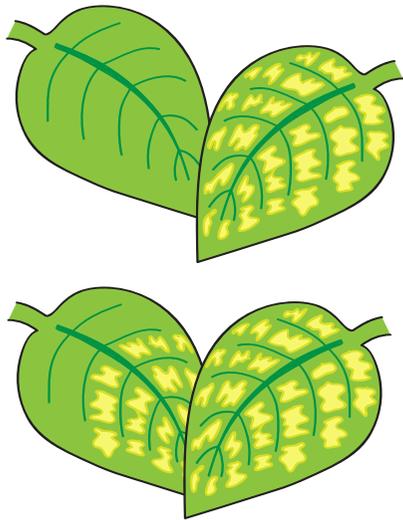
### HIV

★ Describe how HIV can spread, its symptoms and how it is prevented.



### TOBACCO MOSAIC VIRUS

★ Describe how TMV can spread, its symptoms and how it is prevented.



# VIRAL DISEASES

## << QUICK QUESTIONS >>

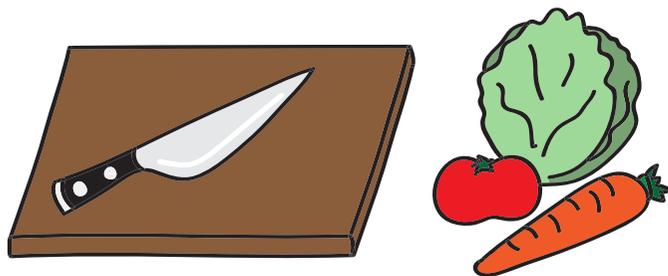
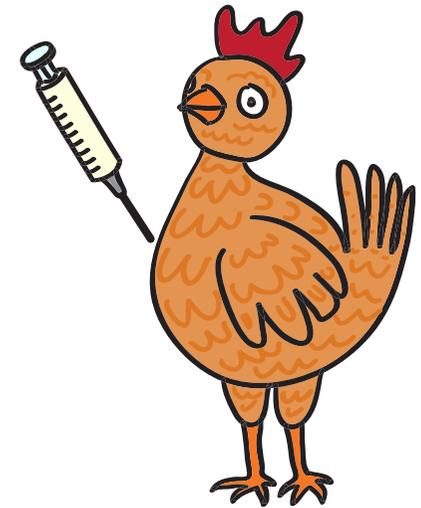
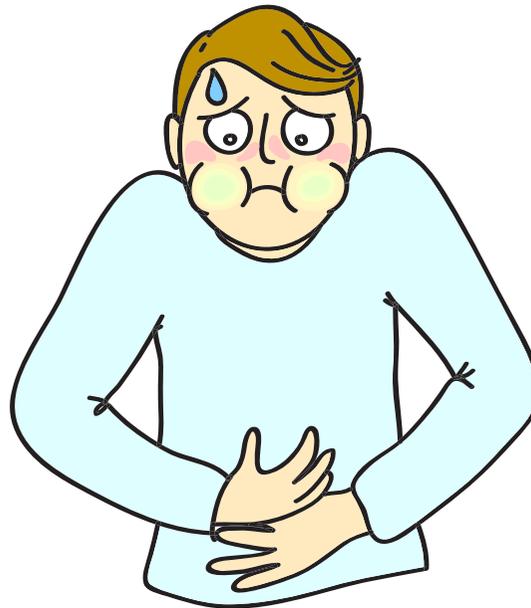
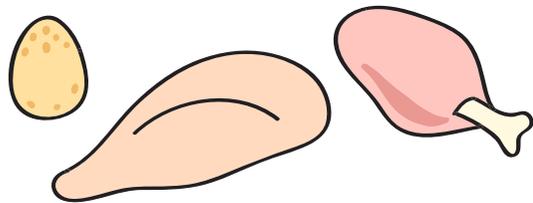
### BIOLOGY TOPIC 3

1. Why are viral diseases difficult to treat?
2. How does the measles virus spread?
3. Explain why blood from donors should be screened before being used for a transfusion.  
(A transfusion is when blood from one person is put into another).
4. Name the disease that causes discolouration of plant leaves in a distinct pattern.



### SALMONELLA

★ Describe how Salmonella can spread, its symptoms and how it is prevented.

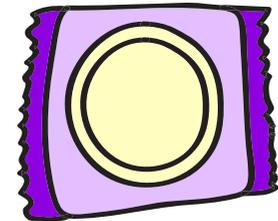
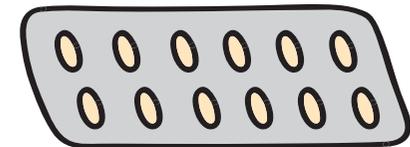
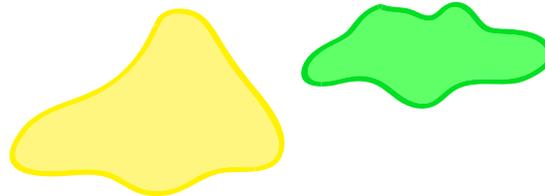


### GONORRHOEA



Describe how Gonorrhoea can spread, its symptoms and how it is prevented.

# S.T.D



# BACTERIAL DISEASES

## << QUICK QUESTIONS >>

### BIOLOGY TOPIC 3

1. What type of pathogen causes salmonella and gonorrhoea?

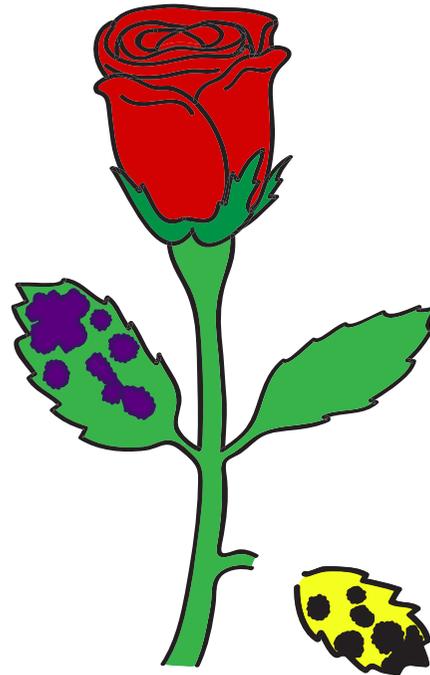
2. What are the symptoms of gonorrhoea?

3. How can the spread of salmonella be reduced? Give 2 ways.



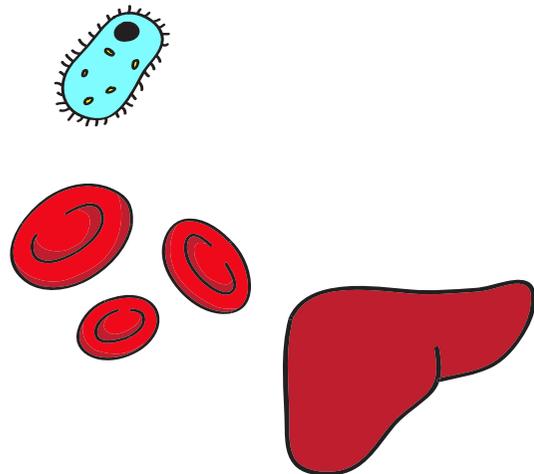
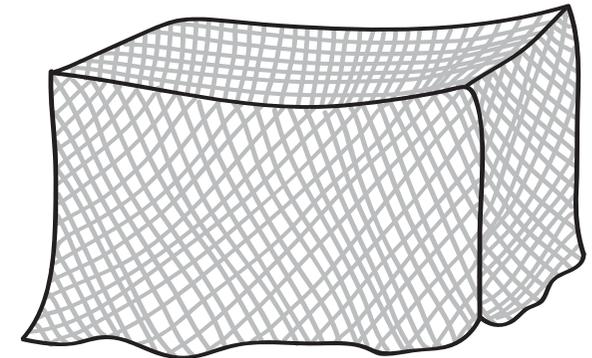
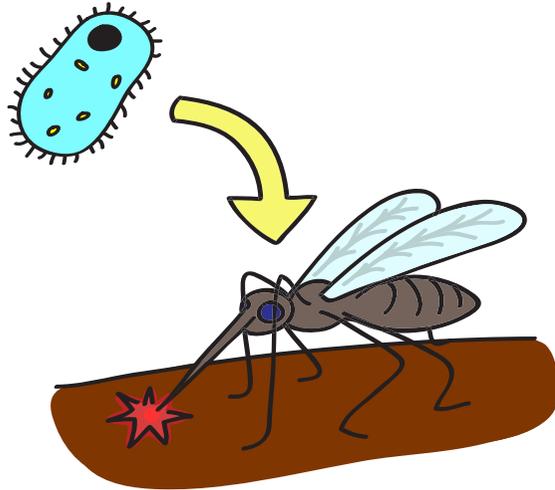
### ROSE BLACK SPOT

★ Describe how Rose Black Spot can spread, its symptoms and how it is treated.



# MALARIA

★ Describe how Malaria can spread, its symptoms and how it is prevented.



# FUNGAL AND PROTIST DISEASES

## BIOLOGY TOPIC 3

### << QUICK QUESTIONS >>

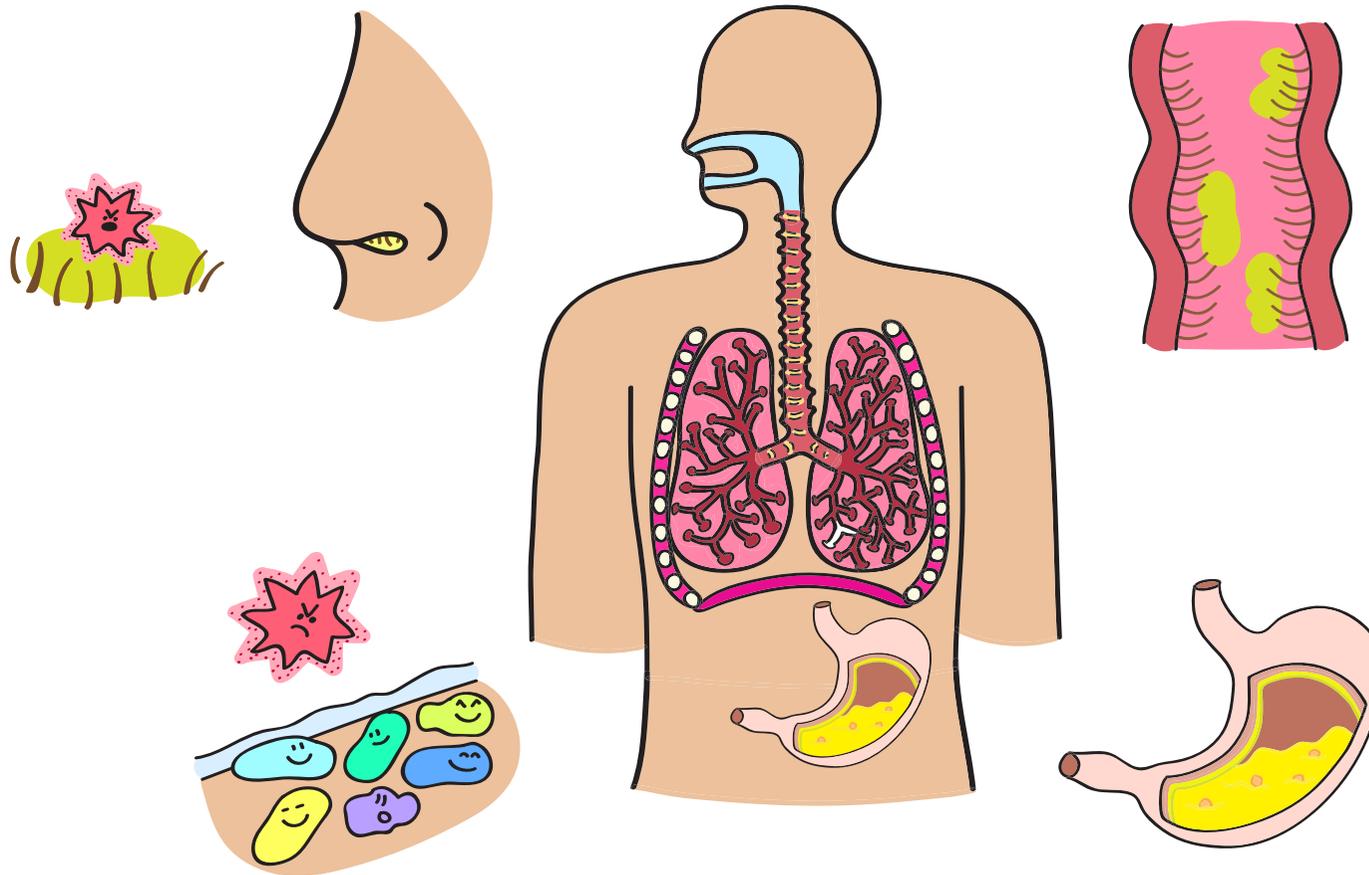
1. How can rose black spot spread?
2. Name the type of pathogen that causes:
  - A) Malaria
  - B) Rose black spot
  - C) Salmonella
  - D) Measles
3. Explain how rose black spot affects the growth of rose plants.



# HUMAN DEFENCE SYSTEMS

## THE IMMUNE SYSTEM

★ Describe the four non-specific methods of defence against pathogens in the human body.

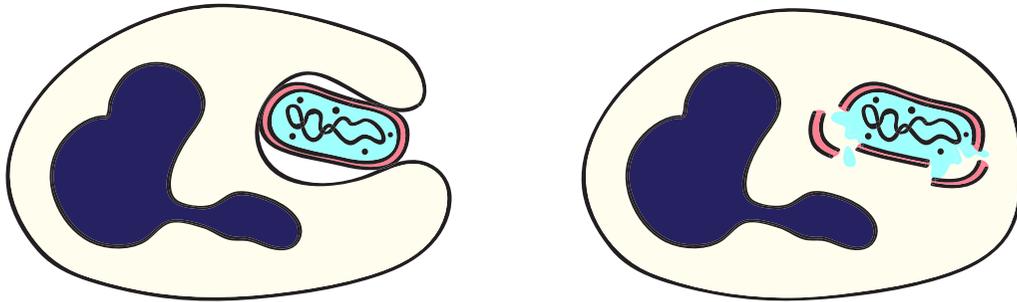


# HUMAN DEFENCE SYSTEMS

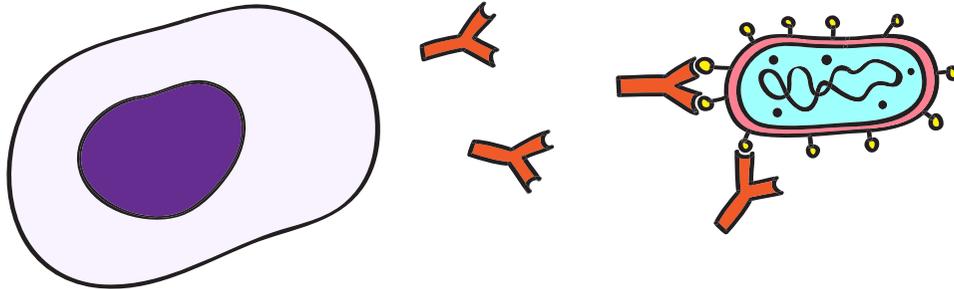
## THE IMMUNE SYSTEM

★ Describe how the immune system responds to pathogens.

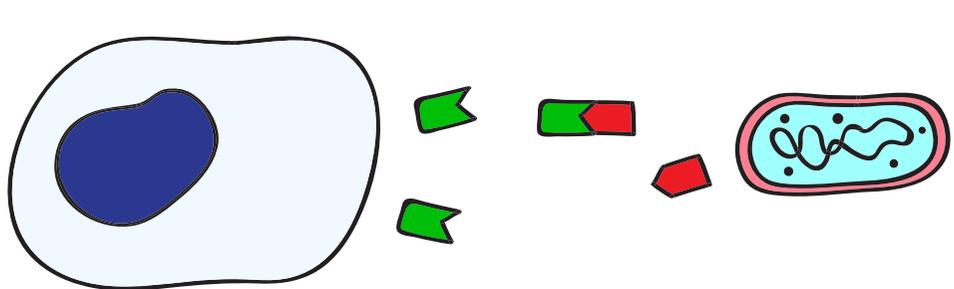
1



2



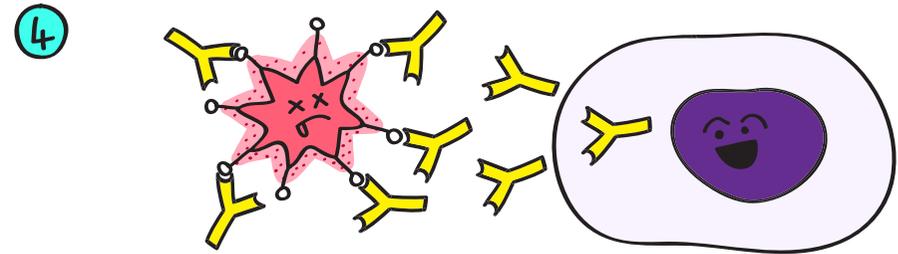
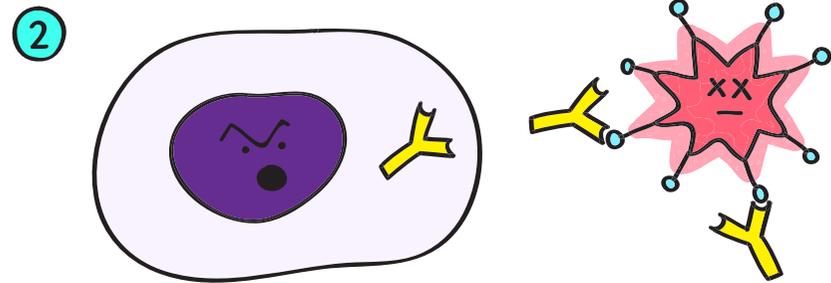
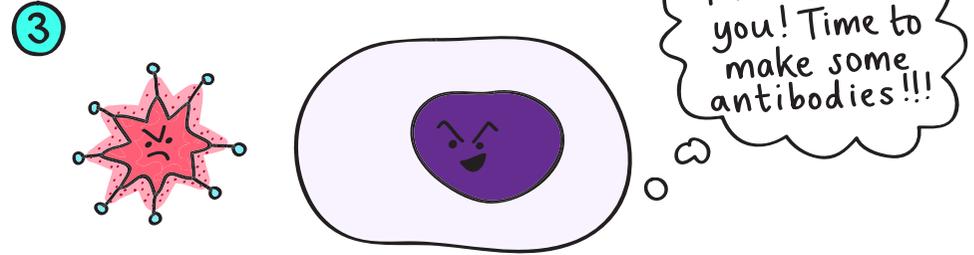
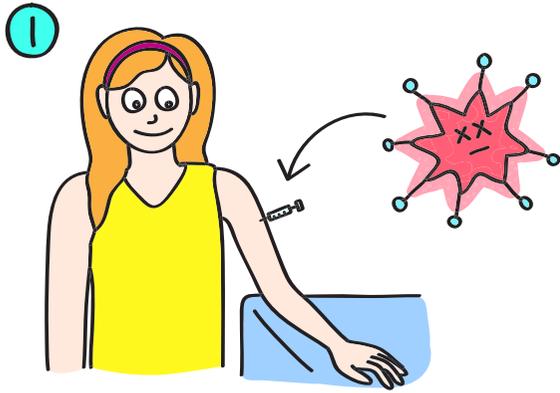
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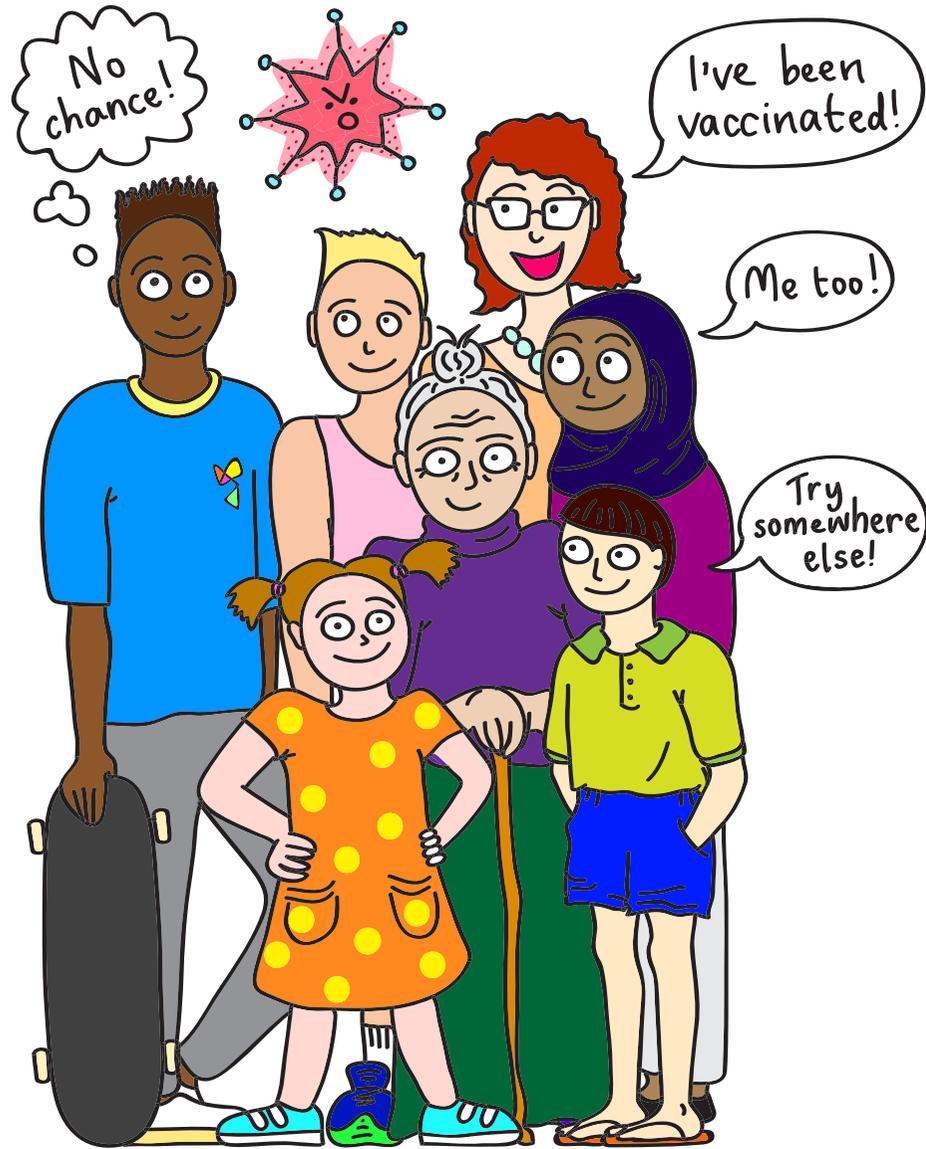




# VACCINATIONS

★ To explain how vaccination works, write a short description for each of these four stages:





Describe how vaccinations can help a population achieve herd immunity.



# VACCINATIONS

<< QUICK QUESTIONS >>

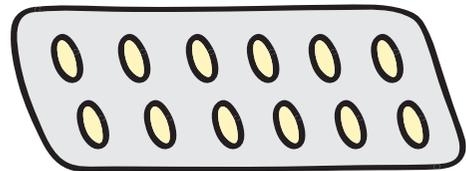
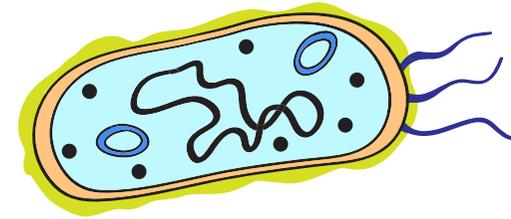
1. What is in a vaccine?
2. How does the measles vaccination prevent a person from getting measles?
3. A person who has not been vaccinated for a specific disease may still be protected against it. Explain how this is possible.



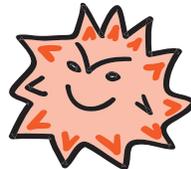
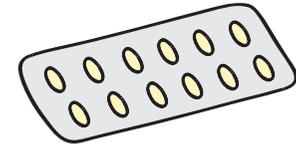
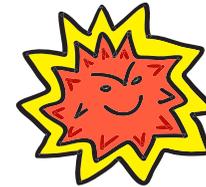
# ANTIBIOTICS AND PAINKILLERS



Use the diagrams below to describe what antibiotics are and which type of pathogen they are used to destroy.

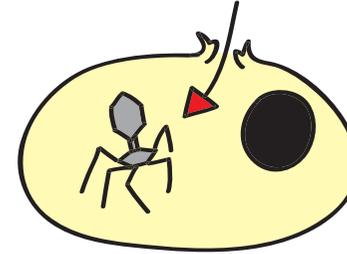
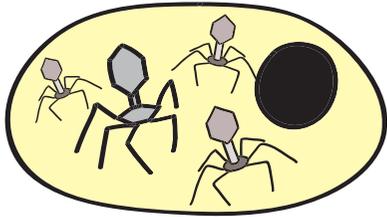


What issue is facing the use of antibiotics in medicine?

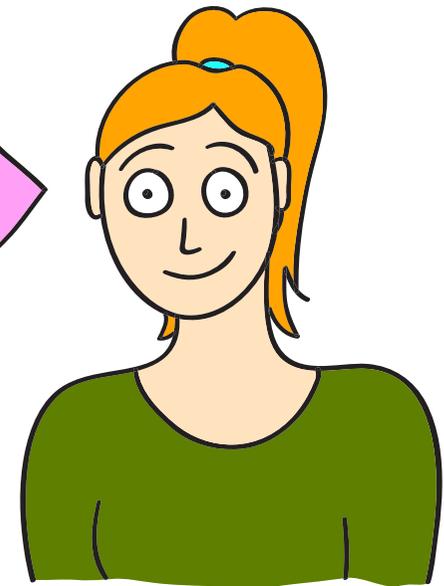
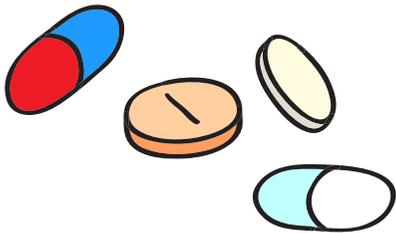


# ANTIBIOTICS AND PAINKILLERS

★ Describe why it is hard to develop drugs that destroy viruses.



★ Describe what painkillers can do to help a person if they feel ill.



# ANTIBIOTICS AND PAINKILLERS

## BIOLOGY TOPIC 3

### << QUICK QUESTIONS >>

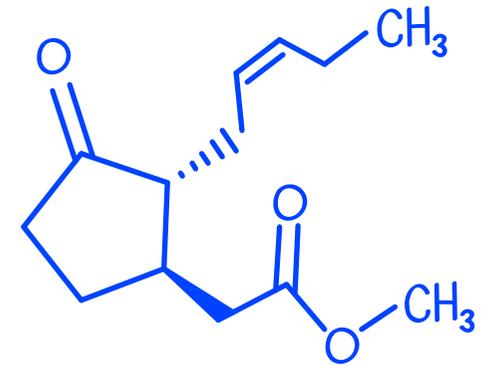
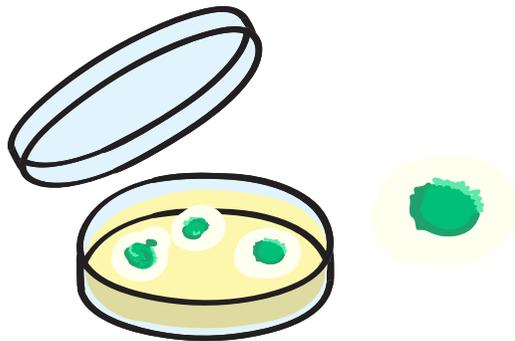
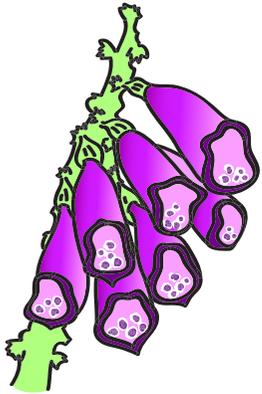
1. Describe the difference between antibiotics and antibodies.
2. A patient goes to their G.P. as they have a bad cold. The G.P. doesn't prescribe antibiotics for this. Suggest why not.
3. What medicine might the doctor suggest the patient take instead? In your answer, include the effect of this medicine.



# THE DISCOVERY AND DEVELOPMENT OF DRUGS



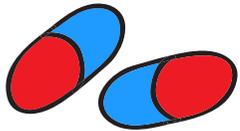
Using the pictures below, describe three examples of drugs that were discovered and extracted from plants or microorganisms.



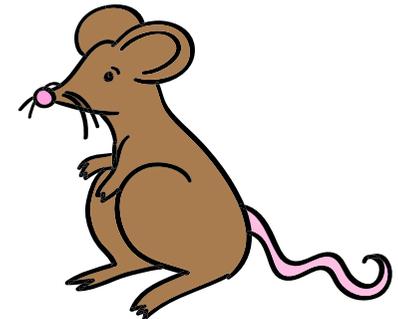
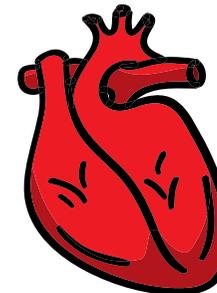
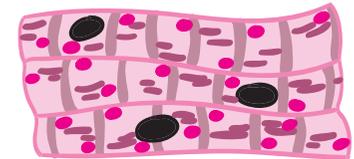
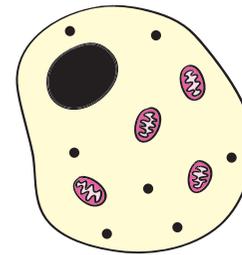
Describe how drugs are synthesised nowadays.

# THE DISCOVERY AND DEVELOPMENT OF DRUGS

★ Describe the three things that drugs are tested for.

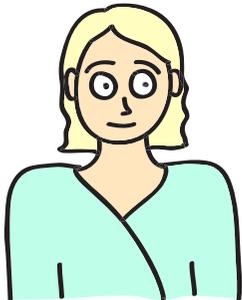
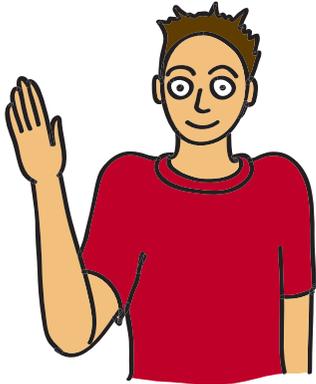


★ Describe what preclinical testing is and where it occurs.

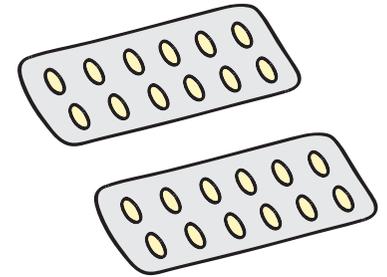


# THE DISCOVERY AND DEVELOPMENT OF DRUGS

★ Describe what happens during clinical trials.



★ Explain what is meant by the term "double blind trial".



★ How can we be sure that drugs trials are robust and the results are true?



# THE DISCOVERY AND DEVELOPMENT OF DRUGS

## << QUICK QUESTIONS >>

1. Match the drug to the plant or microorganism it was originally extracted from:

*Aspirin*

*Penicillium*

*Penicillin*

*Willow*

*Digitalis*

*Fox glove*

2. What 3 things should new medical drugs be tested for?

3. Name and describe the first stage of drugs testing.



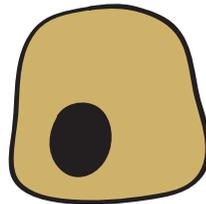
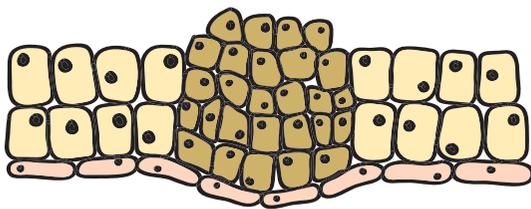
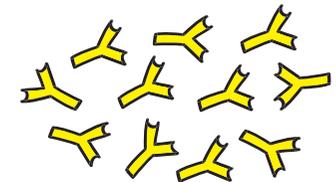
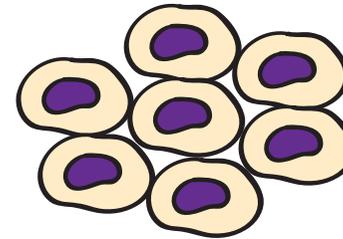
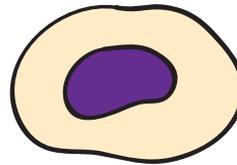
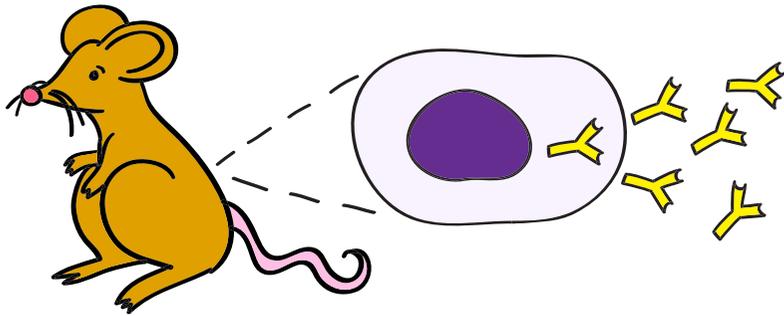
# MONOCLONAL ANTIBODIES



Describe how monoclonal antibodies are produced in the laboratory.

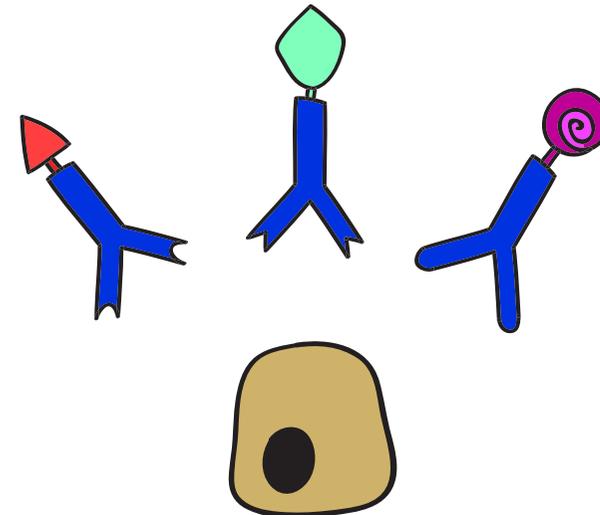
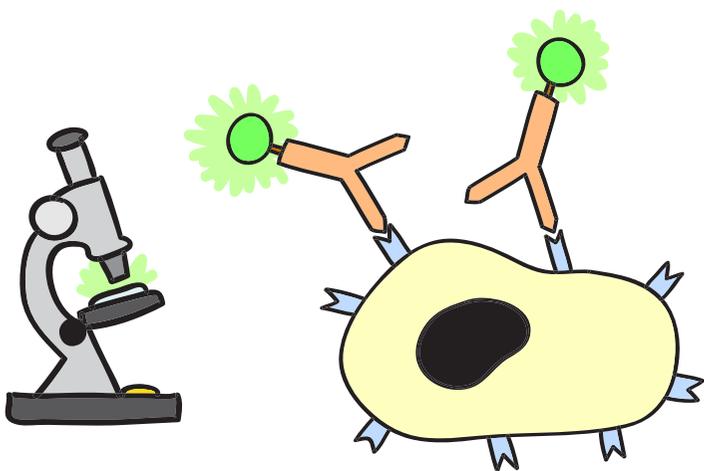
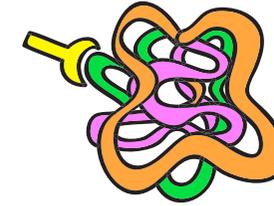
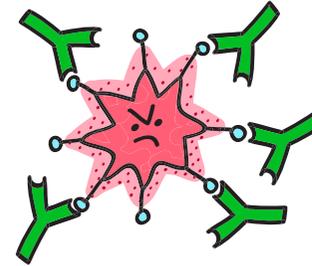
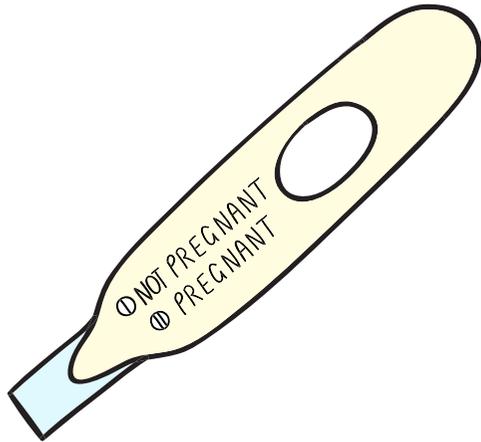


Describe the property that allows monoclonal antibodies to target specific cells or chemicals.



# MONOCLONAL ANTIBODIES

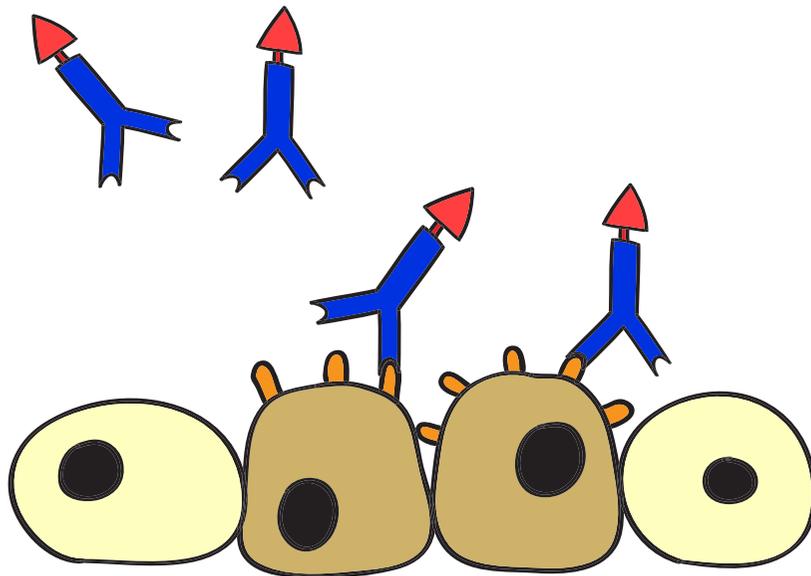
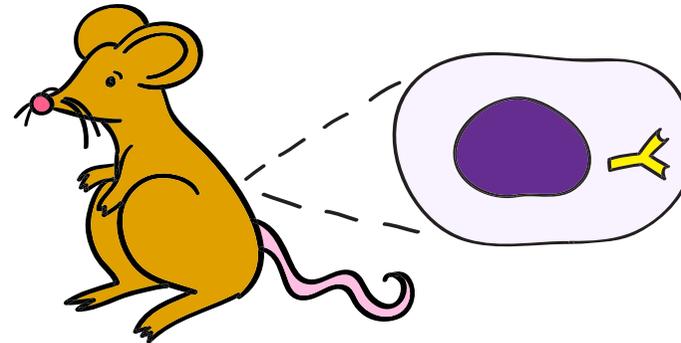
★ Describe the four uses of monoclonal antibodies shown below:



# MONOCLONAL ANTIBODIES

★ Describe the main advantage and disadvantage of monoclonal antibodies.

BIO ONLY



# MONOCLONAL ANTIBODIES

## << QUICK QUESTIONS >>



1. Which two cells are used to create a hybridoma cell?
2. What is the main advantage of monoclonal antibodies over conventional drugs?
3. Why are monoclonal antibodies not as widely used as first hoped?



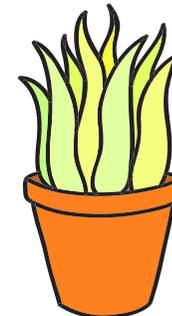
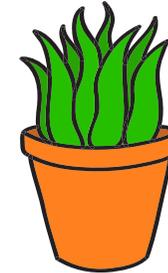
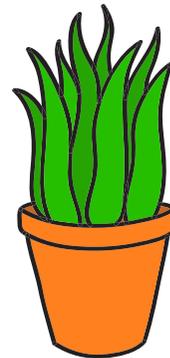
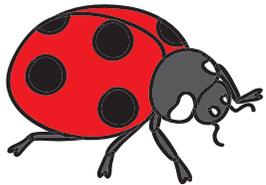
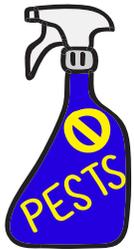
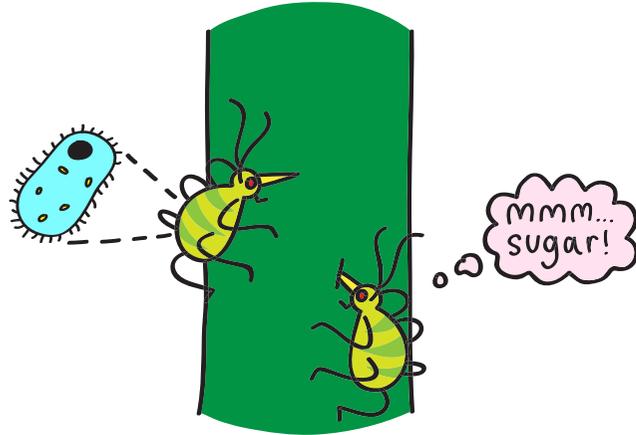
# PLANT DISEASES



Describe how aphids can damage plants and how these pests can be destroyed.



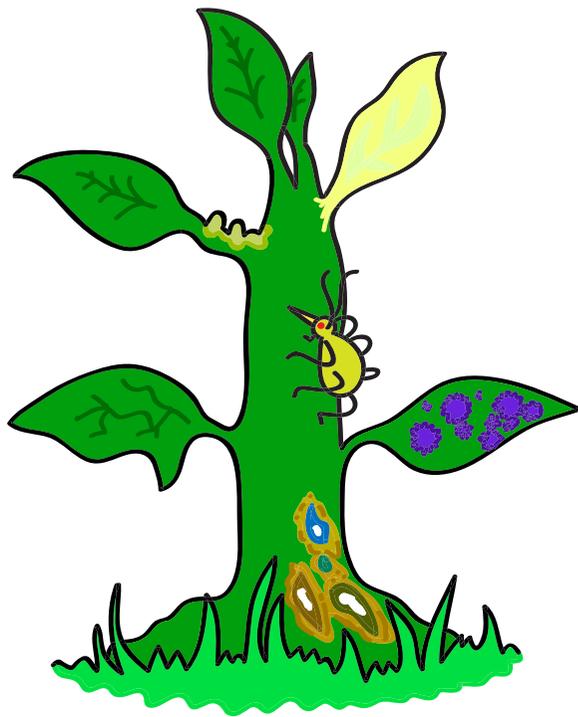
Explain what is meant by an ion deficiency and then describe the two ion deficiencies shown:



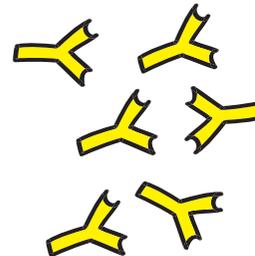
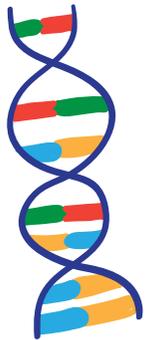
# PLANT DISEASES



Label this diagram with seven symptoms that can indicate the presence of disease in plants:



Describe how plant diseases can be identified.



# PLANT DISEASES

## << QUICK QUESTIONS >>

BIOLOGY TOPIC 3



1. State two reasons why aphids are described as garden pests.
2. Explain why magnesium ion deficiency can impact the growth of a plant.  
(This links to Topic 1 Cells and Topic 4 Bioenergetics).
3. A crop farmer spots some signs of disease in her plants but cannot identify the disease from her gardening manual. What other methods could she use to identify the disease? (*Higher Tier*)

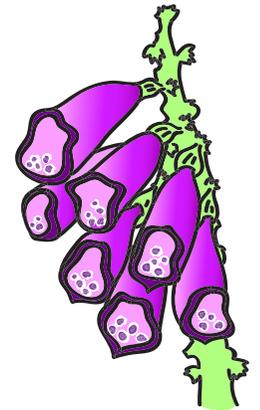
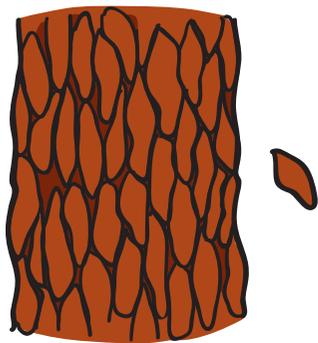
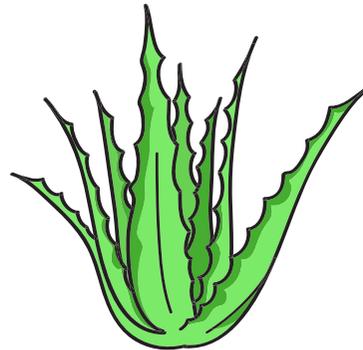
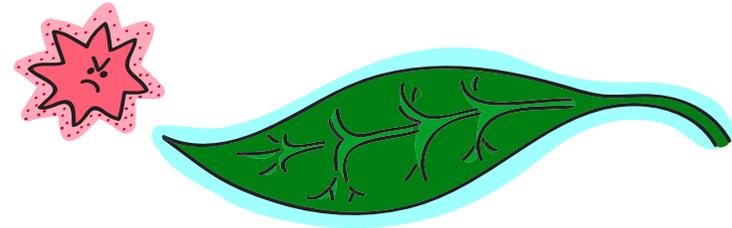
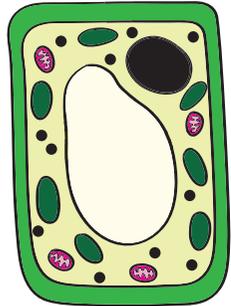
# PLANT DEFENCES



Describe the physical and chemical defences that plants use - include the type of organism that it defends against (e.g. pathogen, insect, large animals).

## PHYSICAL

## CHEMICAL



# PLANT DEFENCES

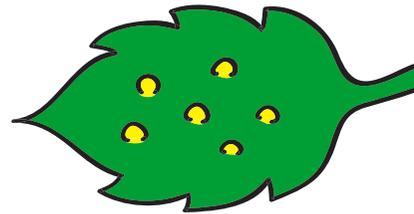


Describe the mechanical defences that plants use - include the type of organism that it defends against (e.g. pathogen, insect, large animals).

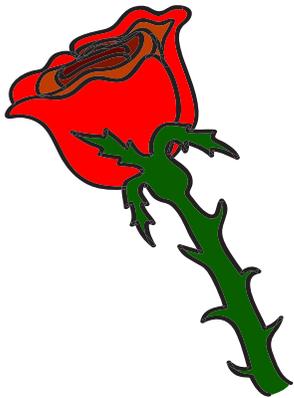
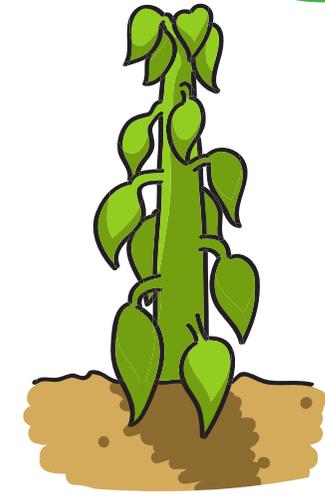
## MECHANICAL



Better lay my eggs on another leaf!



BIO ONLY



# PLANT DEFENCES

## << QUICK QUESTIONS >>

BIOLOGY TOPIC 3

BIO  
ONLY

1. State the three physical defenses that plants have against pathogens.

2. Describe the defence adaptation of this gorse bush and name the type of organisms it defends against.



1. What is meant by the term “pathogen”? (2)

2. Tick (✓) the two boxes of the diseases that are caused by species of bacteria. (2)

- HIV
- Salmonella
- Rose black spot
- Measles
- Gonorrhoea

3. Describe the symptoms of gonorrhoea. (2)

4. Name the disease that can cause initial symptoms of flu, including fever and shaking. (1)

5. A) Rose black spot is a disease that affects the leaves of plants. State how this disease can spread. (2)

B) A viral disease can also affect the leaves of plants, causing them to be discoloured. Name the virus that causes this and explain the impact of leaf discolouration on the plant. (3)

6. Tick one box in each row to show how each disease spreads. (3)

Disease	Method of transmission (spreading)		
	Air	Water	Direct contact
Measles			
HIV			
TMV			

7. Malaria is a disease caused by a Plasmodium protist. Name and explain why this insect (pictured right) is the focus of malaria prevention. (3)



Image by Wikimages from Pixabay.

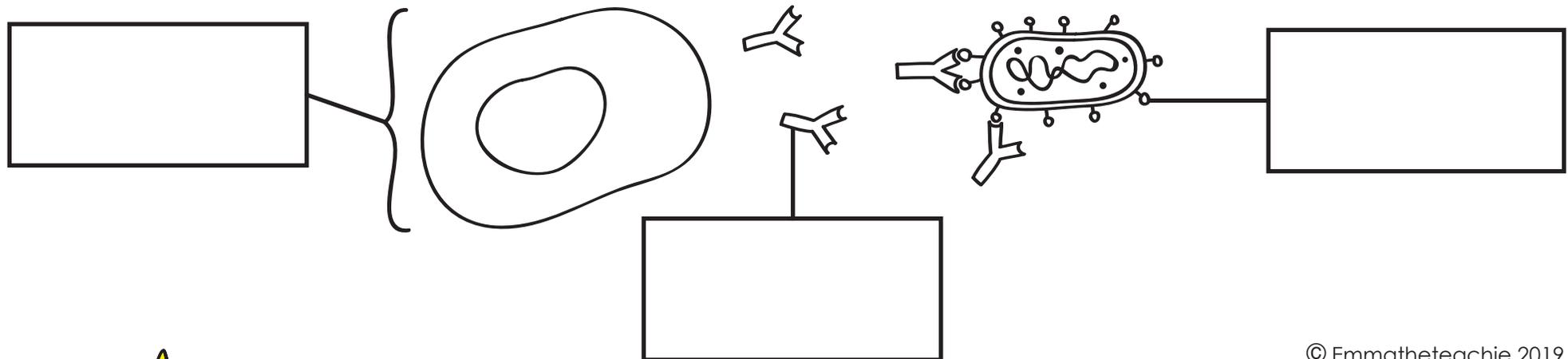
8. How do bacterial pathogens cause illness in a person? (2)

9. Gonorrhoea is treated using antibiotics. Explain why this method of treatment will not work for measles. (2)

10. The human body has non-specific defence systems against pathogens - if the pathogen makes it past these, it will encounter the immune system.

Describe the non-specific defence systems of the human body against pathogens. (4)

11. The diagram below shows one response of the immune system to a bacterial pathogen. Complete the labels using appropriate words. (3)



12. Question eleven shows one methods of response by the immune system to bacterial pathogens. Name and describe the two other methods of response. (4)

Name of method	Description of method

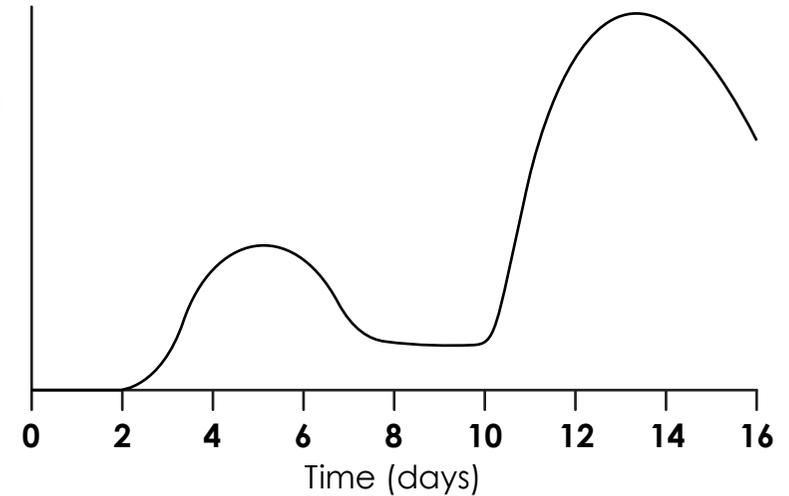
13. Some farmers vaccinate their livestock against Salmonella. Suggest why this is done. (1)

14. What do vaccines contain? (1)



15. Vaccinations can help prevent people from getting diseases. This graph shows how the levels of antibodies change over time after a person is injected with a vaccine.

Concentration of antibodies in the blood (arbitrary units)



A) How many days did it take before the person's body began producing antibodies? (1)

B) Soon after receiving the vaccine, the person got infected with live pathogens. Use the graph to state and explain which day this happened on. (2)

C) The person did not get ill from the infection. Use the graph and your own knowledge to explain why. (3)

16. The antibodies produced against pathogens of one disease are not effective against other diseases. Explain why. (2)

17. Traditionally, new drugs were developed using extracts from plants and microorganisms. Complete the table below to show examples of this. (3)

Name of plant / microorganism	Name of drug
	Aspirin
Fox glove	
	Penicillin

18. Penicillin is an antibiotic. Who discovered this drug? (1)

19. What type of pathogen do antibiotics destroy? (1)

# EXAM-STYLE QUESTIONS

## BIOLOGY TOPIC 3

### << ANSWERS >>

20. Mumps is a disease caused by a virus. Explain why it is difficult to develop drugs to treat this disease. (2)
21. What medication can be given to patients of mumps to relieve their symptoms? (1)
22. Developing and testing new drugs can take many years. Explain what testing must be done before new drugs can be used to treat people. (6)



23. Some farmers give their livestock antibiotics regularly to prevent them getting ill. The World Health Organisation (WHO) is recommending farmers to stop using antibiotics in this way. Explain why they are recommending this. (2)



Image by Klimkin from Pixabay.

24. New drugs must be tested for efficacy. Explain what “efficacy” means. (1)

25. In May 2019, the United Nations (UN) released a report on Biodiversity. It found that around 1 million animal and plant species are now threatened with extinction. In terms of drug development, explain why this is a concern. (1)



26. Mice can be stimulated to produce antibodies. This is the first stage in the production of monoclonal antibodies.

A) Name the type of cell that produces antibodies. (1)

B) The cell in part A is combined with a tumour cell, to create a cell that has properties of both cell types. What is this new cell called? (1)

C) Monoclonal antibodies can be used to treat diseases, for example, cancer. Explain how this method of treatment works. (2)

27. Magnesium ion deficiency can cause plant leaves to turn yellow. Name this condition and explain how this can affect the growth of the plant. (3)





28. What do plants use nitrate ions for? (1)

29. Nettle leaves (pictured right) have adaptations to defend against pathogens. Three of these are described in the table below. Decide what type of adaptation each one is. (3)



Description of adaptation	Type of adaptation
Poison - deters animals from eating it	
Hairs - more difficult for insects to lay eggs on it	
Dead layers of cells around stem - barrier to pathogens	

30. Bark on trees is a physical defence against pathogens. Describe how this adaptation works. (2)

# EXAM-STYLE QUESTIONS

## << ANSWERS >>

1. A microorganism (1) that causes disease (1)

2.  Salmonella (1)

Gonorrhoea (1)

*If any additional boxes are ticked, no marks are awarded.*

3. Pain when urinating (1)

Thick yellow or green discharge from the vagina or penis (1)

4. HIV (1)

5. A) Rose black spot can spread by wind (1) and by water (1)

B) Tobacco Mosaic Virus (1)

Discolouration causes less photosynthesis (due to less chlorophyll) (1)

Which reduces growth of the plant (1)

6.

Disease	Air	Water	Direct contact
Measles	✓		
HIV			✓
TMV			✓

(1) mark for each correct tick.

*If any additional boxes are ticked, 1 mark is lost for each additional tick.*



### << ANSWERS >>

7. The insect is a mosquito (1)

Mosquitos are vectors of malaria (1)

- *It is also acceptable to say they carry malaria.*

Destroying / killing mosquitos / preventing them from biting humans prevents the spread of malaria (1)

- *You only need to say one of the above (destroying / killing / prevention of biting) in your answer.*

8. Bacteria reproduce rapidly in the body (1)

They release toxins that damage cells / tissues (1)

- *It is acceptable to say poisons instead of toxins.*

9. Measles is caused by a virus (1)

Antibiotics cannot destroy / kill viruses (1)

- *It is also acceptable to say antibiotics ONLY kill bacteria.*

10. Any four from:

- The skin acts as a barrier to pathogens / it has a layer of microorganisms which acts as a barrier

- The skin produces antimicrobial secretions to kill pathogens

- The nose contains mucus to trap pathogens

- The trachea and bronchi contain mucus to trap pathogens

- The trachea and bronchi are lined with cilia to waft mucus up to the back of the throat to be swallowed

- The stomach contains hydrochloric acid to kill pathogens that enter it

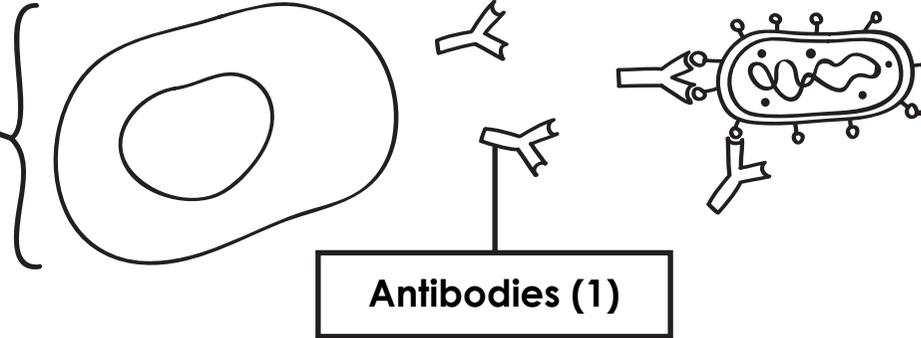


# EXAM-STYLE QUESTIONS

<< ANSWERS >>

11.

White blood cell  
- lymphocyte is  
also correct (1)



12.

Name of method	Description of method
Phagocytosis (1)	White blood cells engulf and digest / break down the pathogens (1)
Antitoxin production (1)	White blood cells produce antitoxins to neutralise / counteract toxins / poisons produced by the pathogens (1)

13. To prevent them passing salmonella to humans (1)

14. A small quantity of dead / harmless / inactive pathogens (1)

15. A) 2 days (1)

*The person received the vaccine on Day 0.  
Day 2 is when the level of antibodies began to increase.*

B) Day 10 (1)

**This is when the concentration of antibodies began to increase after the initial increase caused by the vaccine (1)**

**- You can also say that Day 10 is when the antibodies increased for the second time.**



# EXAM-STYLE QUESTIONS

## << ANSWERS >>

15. C) Antibodies are produced more rapidly (1)

A higher amount of antibodies are produced (1)

- *It is also acceptable to say a higher concentration of antibodies.*

The pathogens are destroyed before they have time to cause symptoms of illness (1)

16. Antibodies have a specific shape for one type of antigen (1)

Different pathogens have different antigens (1)

17.

Name of plant / microorganism	Name of drug
Willow (1)	Aspirin
Fox glove	<b>Digitalis (1)</b>
<b>Penicillium mould (1)</b>	Penicillin

18. Alexander Fleming (1)

19. Bacteria (1)

20. Viruses live / reproduce inside body cells (1)

Drugs that destroy the virus will also damage body cells (1)

21. Painkillers (1)

22. Any six from:

- pre-clinical trials test the drug on cells / tissues / live animals
- to test for toxicity, dosage and efficacy
- clinical trials test the drug on healthy volunteers and patients at very low doses
- to monitor for safety / side effects
- if it is safe, more trials are done to find the optimum dosage and test for efficacy
- double blind trials are used
- the placebo does not contain the new drug
- neither the patient / doctor knows who has placebo and who has the real drug
- the results are peer reviewed
- to help prevent false claims

23. Any two from:

- Overuse of antibiotics contributes to the rise in antibiotic resistant bacteria (1)
- Reducing use of antibiotics in livestock will reduce the risk of this (1)
- Antibiotics should only be used to cure infections, not prevent them (1)

24. Efficacy means the drug treats the disease (1)

25. Chemicals extracted from plants are still the basis for many new drugs (1)

26. A) Lymphocyte (1)

# EXAM-STYLE QUESTIONS

## << ANSWERS >>

26. B) A hybridoma (1)

C) The monoclonal antibody attaches to antigens on the cancer cell (1)  
And delivers a substance to the cell to kill it or limit its growth (1)

*You can give examples of substances, e.g. radioactive or toxic substances.*

27. The condition is chlorosis (1)

It reduces the chlorophyll in the leaves (1)

Which reduces the amount of photosynthesis and therefore growth of the plant (1)

28. Plants use nitrate ions for protein synthesis (1)

- *it is also acceptable to say for growth (as that is what the proteins are used for).*

29.

Description of adaptation	Type of adaptation
Poison - deters animals from eating it	Chemical (1)
Hairs - more difficult for insects to lay eggs on it	Mechanical (1)
Dead layers of cells around stem - barrier to pathogens	Physical (1)

30. Pieces of bark can fall off (1)

Removing pathogens from the plant (1)

### YOUR TASK: DESIGN A SUPERBUG

No, it's not a superhero - in fact, it's quite the opposite!  
Your superbug is a villain and living organisms are its target.  
Here's what to include in your superbug creation:

#### Transmission

What method(s) can your superbug use to spread?  
Has it got any special features to help it do this?

#### Symptoms

What type of organism does your superbug infect? And what symptoms does it cause?

#### Name

Give your superbug its very own name - you can write this as a species name, e.g. *Helicobacter pylori*

#### Type of pathogen

What group of pathogen does your superbug belong to? Give it some features from this group!

#### Prevention & cure

How can your superbug be stopped? Is there a way to prevent it from infecting organisms in the first place? Can it be destroyed once it has infected an individual? If so, how can this be done?

TURN OVER TO START DESIGNING YOUR SUPERBUG!

# BONUS ACTIVITY

BIOLOGY TOPIC 3

## YOUR TASK: DESIGN A SUPERBUG

Go crazy (on this piece of paper at least) and create your superbug in this space!

### REMEMBER TO INCLUDE:

- Transmission (how it spreads)
- Symptoms caused by it
- The name of it
- The type of pathogen it is
- How to prevent and cure the disease



☆☆★ **THANK YOU** ★☆☆

**THANKS & BYE!**



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