

**AQA, OCR, Edexcel**

**GCSE Science**

# **GCSE Biology**

**Viral Diseases Answers**

Name:

**M M E**

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Total Marks: /20

Q1: What is the difference between a virus and a bacteria?

A= Virus can only reproduce inside the host cell.

(1 mark)

Q2: What are the main symptoms of measles?

A= 1 mark for each of the following:

- Fever
- Rash

(2 marks)

Q3: Explain how measles is spread.

A= Inhaling droplets from coughs/ sneezes.

(1 mark)

Q4: The numbers of cases of measles are now low in the UK. Discuss the reasons for this.

A= 1 mark for each of the following points:

- Better living conditions
- Vaccination Program

(2 marks)

Q5: How can a population eradicate measles?

A= Vaccinate all the population.

(1 mark)

Q6: Measles is what type of disease? Tick one.

Genetic

Infectious

None Infectious

A= Infectious

Awarded for clearly ticked box any mistakes must be clearly crossed out

(1 mark)

Q7: Explain how HIV is transmitted.

A= Sexually transmitted/ exchange of bodily fluids

(1 mark)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q8: Discuss the link between HIV and AIDS.

A 1 mark for HIV / 1 mark for AIDS point:

- HIV – Infection – damages immune system
- AIDS – Badly damaged immune system

(2 marks)

Q9: If left untreated what other conditions can a HIV/ AIDS patient develop and why.

A= 1 mark for each of the following

- No immune system / ineffective
- Cancers
- Infections

(3 marks)

Q10: Give 2 ways of preventing the spread of HIV.

A= Accept any 2 of the following:

- Education
- Condoms
- Abstinence
- Not sharing needles
- Screen blood transfusions
- HIV positive mothers – not breast feed

(2 marks)

Q11: Tobacco mosaic virus is an infectious plant disease. Explain why plants affected often have stunted growth.

A= can't photosynthesise

(1 mark)

Q12: Explain what vector transmits Tobacco mosaic virus.

A= Seeds

(1 mark)

Q13: What ways can farmers prevent the spread of tobacco mosaic virus?

A= Accept any 2 of the following:

- Genetically modified crops/ resistant crops
- Good field hygiene
- Pest control

(2 marks)

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# **GCSE Biology**

## **Viral Diseases Questions**

Name:

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**Total Marks: /20**

Q1: What is the difference between a virus and a bacteria?

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(1 mark)

Q2: What are the main symptoms of measles?

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(2 marks)

Q3: Explain how measles is spread.

---

(1 mark)

Q4: The numbers of cases of measles are now low in the UK. Discuss the reasons for this.

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(2 marks)

Q5: How can a population eradicate measles?

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(1 mark)

Q6: Measles is what type of disease? Tick one.

Genetic

Infectious

None Infectious

(1 mark)

Q7: Explain how HIV is transmitted.

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(1 mark)

Q8: Discuss the link between HIV and AIDS.

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(2 marks)

Q9: If left untreated what other conditions can a HIV/ AIDS patient develop and why.

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(3 marks)

Q10: Give 2 ways of preventing the spread of HIV.

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(1 mark)

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(1 mark)

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(2 marks)

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**GCSE Science**

# **GCSE Biology**

**Bacterial Diseases Answers**

Name:

**M M E**

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Total Marks: /26

Q1: How are bacterial diseases treated?

A= Antibiotics

(1 mark)

Q2: Why are antibiotics becoming less effective?

A= Bacterial Resistance

(1 mark)

Q3: Explain how antibiotics work.

A= 1 mark for each of the following:

- Kill Bacteria
- Prevent bacteria growing

(2 marks)

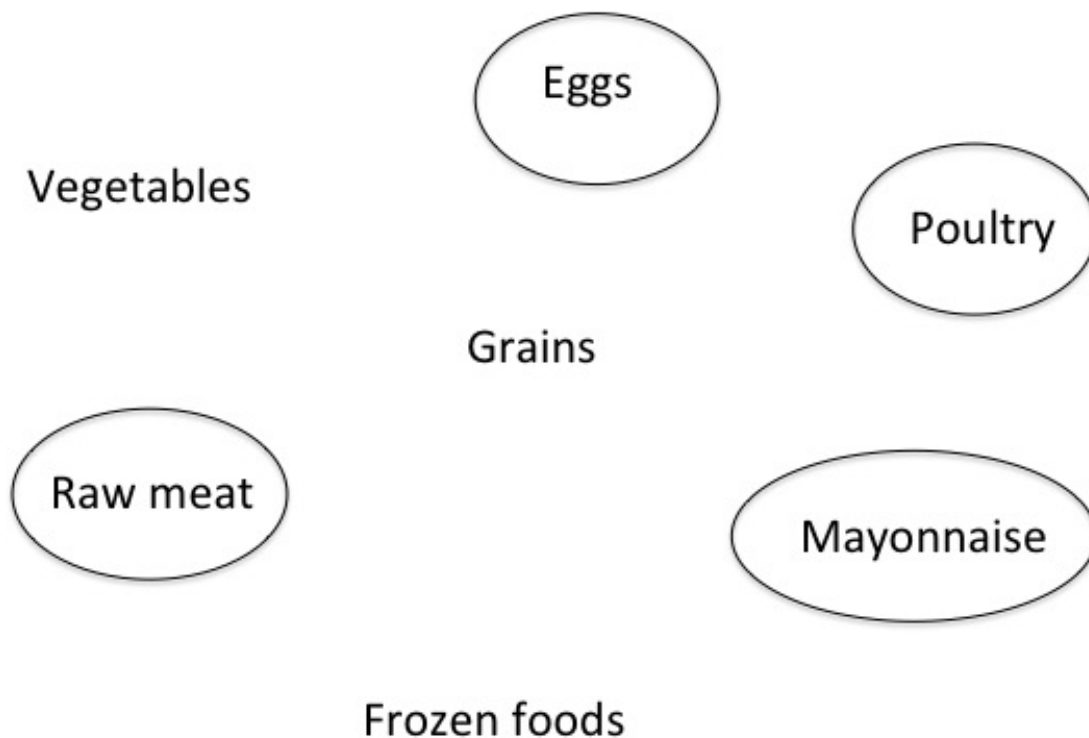
Q4: Explain how *salmonella* causes infection.

A= 1 mark for each of the following points:

- Infect the gut / gastric system
- Disrupt the natural bacterial balance in the gut.

(2 marks)

Q5: Circle the potential sources of *Salmonella*.



A= 1 mark for each correct circle

(4 marks)



Q6: Discuss the symptoms of *Salmonella* poisoning.

A= Accept any 3 of the following:

- Fever
- Abdominal cramps
- Vomiting
- Diarrhoea

(3 marks)

Q7: What causes the symptoms from the *Salmonella* bacteria.

A= Toxins

(1 mark)

Q8: How does the UK reduce the number of *Salmonella* food poisoning cases?

A= All UK poultry is vaccinated

(1 marks)

Q9: Discuss ways *Salmonella* poisoning can be reduced in cooking.

A= Accept any 3 of the following:

- Keep raw poultry/ Chicken separate
- Don't wash meat
- Wash hands after handling raw meat
- Wipe surfaces
- Cook thoroughly

(3 marks)

Q10: What sort of disease is Gonorrhoea?

A= Sexually transmitted disease

(1 mark)

Q11: Discuss the symptoms and treatments of Gonorrhoea.

A= Accept any 3 of following symptoms:

- Thick yellow/ green discharge
- Pain urinating
- Pelvic pain – untreated
- Infertility – long term
- Asymptomatic / no symptoms
- Ectopic pregnancies

Accept any 3 of the following treatments:

- Antibiotics
- Education
- Barrier method contraception /Condoms
- Limit number of sexual partners

(6 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q12: Why is Gonorrhoea becoming more difficult to treat?

A= Bacterial Resistance

(1 mark)

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**GCSE Science**

# **GCSE Biology**

## Bacterial Diseases Questions

Name:

**M M E**

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Total Marks: /26

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Q1: How are bacterial diseases treated?

---

(1 mark)

Q2: Why are antibiotics becoming less effective?

---

(1 mark)

Q3: Explain how antibiotics work.

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(2 marks)

Q4: Explain how *salmonella* causes infection.

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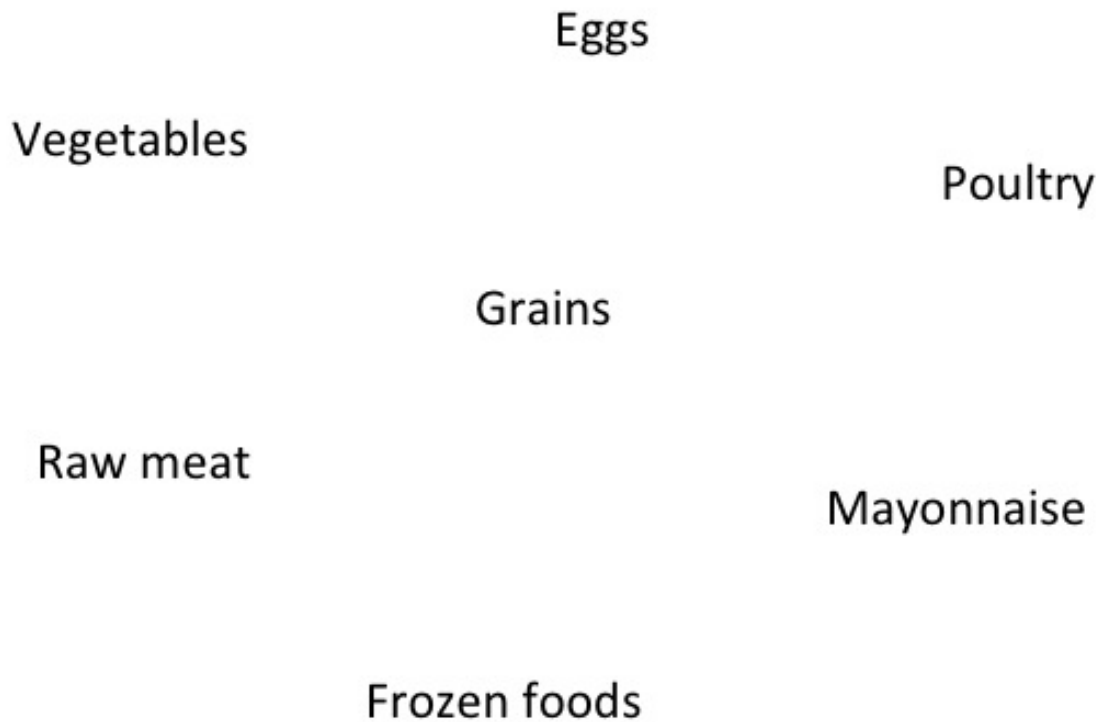
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(2 marks)

Q5: Circle the potential sources of *Salmonella*.



(4 marks)

Q6: Discuss the symptoms of *Salmonella* poisoning.

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(3 marks)

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(1 mark)

Q8: How does the UK reduce the number of *Salmonella* food poisoning cases?

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Q9: Discuss ways *Salmonella* poisoning can be reduced in cooking.

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(3 marks)

Q10: What sort of disease is Gonorrhoea?

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(1 mark)

Q11: Discuss the symptoms and treatments of Gonorrhoea.

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(6 marks)

Q12: Why is Gonorrhoea becoming more difficult to treat?

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(1 mark)

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# GCSE Science

## GCSE Biology

### Microorganism Answers

Name:

**M M E**

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Total Marks: /16

Q1: List 2 ways the human body can prevent bacteria entering the body to cause infection.

A= Marks to be awarded for any 2 of the following

- Stomach acid
- Skin
- Nasal Hair
- Bronchial mucus
- Cilia wafting in the bronchi

(2 marks)

Q2: In order to replicate, bacteria use what method of cell division?

A= Binary Fission

(1 mark)

Q3: *Staphylococcus aureus* reproduces every 20 minutes. If there were 300 bacterial cells replicating in nutrient broth, how many cells would there be in the broth after 24 hours? Show your working.

A= 1 mark to be awarded for showing working

1 mark to be awarded for the correct answer

$$24 \times 60 = 1440 \text{ minutes in 24 hours}$$

$$1440 \div 20 = 72 \text{ replications in 24 hours}$$

$$300 \times 2^{72} = 1.45 \times 10^{24}$$

$$\text{Number of bacterial cells after 24 hours} = \underline{1.45 \times 10^{24}}$$

(2 marks)



Q4: Describe how a laboratory technician would use aseptic techniques to prepare a bacterial culture.

A= 1 mark to be awarded for each point (max 4):

- Sterilize equipment
- Sterilize broth/agar
- Work close to a Bunsen burner
- Store petri dish upside down
- Incubate at 25°C

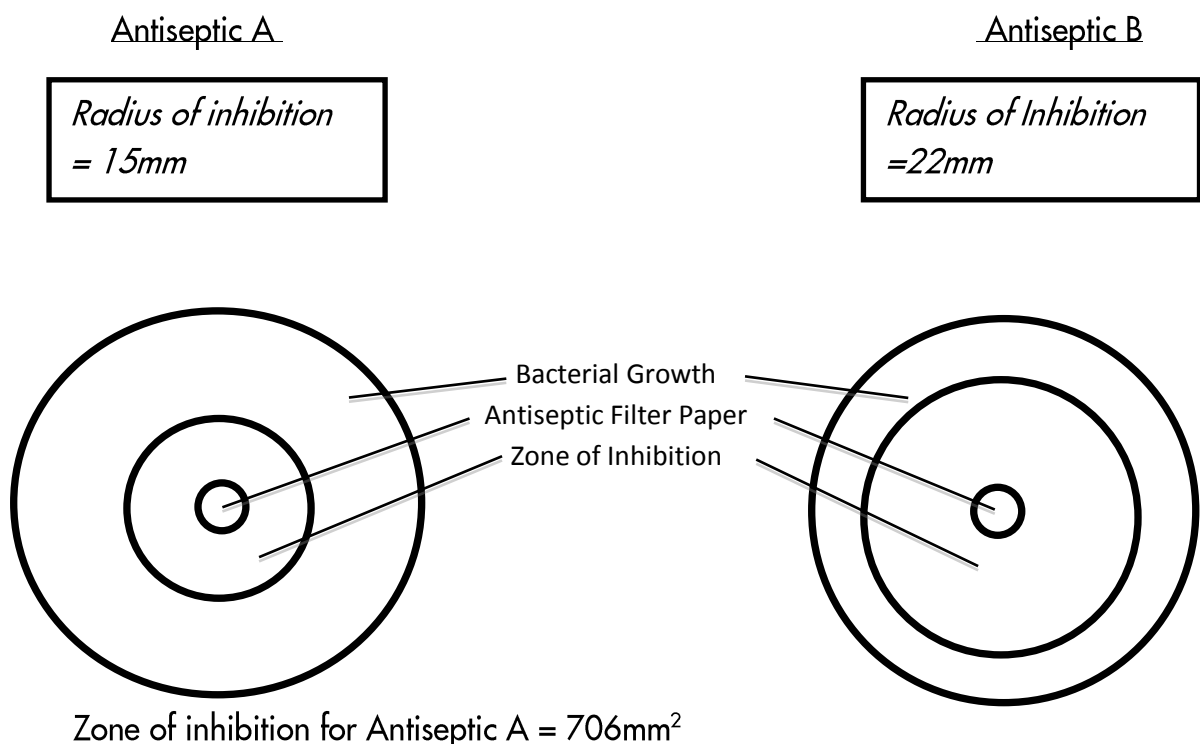
NB: The use of autoclave may be substituted for sterilize

(4 marks)

Q5: *Streptococcus pneumoniae* is a common cause of pneumonia, an infection that affects the lungs. Scientists have developed two antiseptics to help stop the spread of the disease.

By using agar plates and small filter papers containing the antiseptics, the *Streptococcus pneumoniae* is spread across the agar plates to grow. After 48 hours incubation the scientists need to gather the results, to determine which antiseptic is most suitable.

*Figure 1:*



Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

- i) Using the information above calculate the zone of inhibition for antiseptic B.

A= 1 mark for showing working

1 mark for use of correct formula ( $\pi r^2$ )

1 mark for the correct answer

Radius 22mm x Radius 22mm = 484

484 x 3.14 (Pi) = 1519mm<sup>2</sup> (1521mm<sup>2</sup> if  $\pi$  is used fully on calc.)

Zone of inhibition of antiseptic B = 1519 mm<sup>2</sup>

(3 marks)

- ii) Using your results from figure 1, which antiseptic should the scientists use to help stop the spread of *Streptococcus pneumoniae*?

A= Antiseptic B

(1 mark)

Q6: For future experiments the scientists want to improve the validity of their results. List 3 Variables the scientists can control.

A= Marks awarded for any 3 of the following:

- Same amount of broth/ agar
- Same amount of bacteria
- Incubate for the same length for time
- Incubate at same temperature
- Avoid cross contamination
- Use aseptic techniques

(3 Marks)

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**GCSE Science**

# **GCSE Biology**

**Microorganism Questions**

Name:

**M M E**

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**Total Marks: /16**

Q1: List 2 ways the human body can prevent bacteria entering the body to cause infection.

1. \_\_\_\_\_
2. \_\_\_\_\_

(2 marks)

Q2: In order to replicate, bacteria use what method of cell division?

\_\_\_\_\_

(1 mark)

Q3: *Staphylococcus aureus* reproduces every 20 minutes. If there were 300 bacterial cells replicating in nutrient broth, how many cells would there be in the broth after 24 hours? Show your working.

Number of bacterial cells after 24 hours \_\_\_\_\_ (2 marks)

Q4: Describe how a laboratory technician would use aseptic techniques to prepare a bacterial culture.

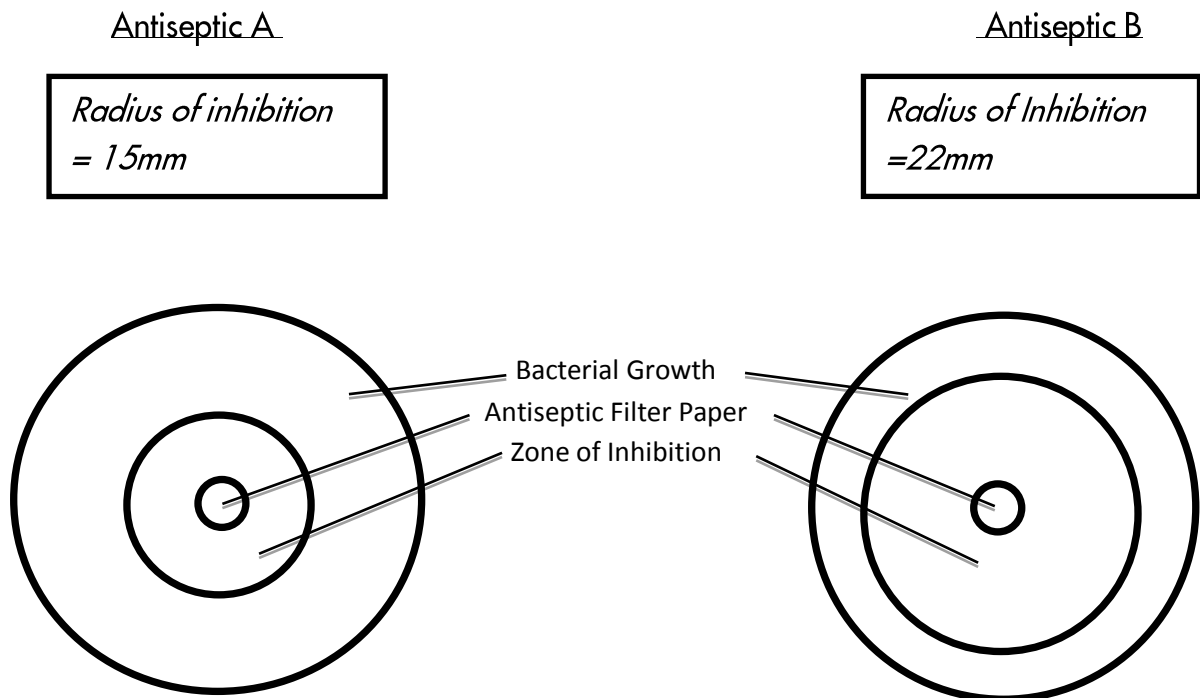
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(4 marks)

Q5: *Streptococcus pneumoniae* is a common cause of pneumonia, an infection that affects the lungs. Scientists have developed two antiseptics to help stop the spread of the disease.

By using agar plates and small filter papers containing the antiseptics, the *Streptococcus pneumoniae* is spread across the agar plates to grow. After 48 hours incubation the scientists need to gather the results, to determine which antiseptic is most suitable.

Figure 1:



Zone of inhibition for Antiseptic A = 706mm

- i) Using the information above calculate the zone of inhibition for antiseptic B.

( $\pi = 3.14$ )

Zone of inhibition of antiseptic B \_\_\_\_\_mm<sup>2</sup>

(3 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

- ii) Using your results from figure 1, which antiseptic should the scientists use to help stop the spread of *Streptococcus pneumoniae*?

\_\_\_\_\_

(1 mark)

Q6: For future experiments the scientists want to improve the validity of their results. List 3 Variables the scientists can control.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

(3 Marks)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

Fungal and Protist Diseases  
Answers

Name:

**M M E**

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Total Marks: /22

Q1: Name a fungal disease, which affects humans.

A= Athletes foot.

Also accept any other correct answer

(1 mark)

Q2: How are plant fungal diseases such as Rose black spot spread?

A= accept one of the following:

- Wind
- Dormant spores in soil

(1 mark)

Q3: Describe the symptoms of rose black spot.

A= Accept any 2 of the following:

- Purple or black spots on the leaves
- Leaves turn yellow
- Loss of leaves
- Weak plants

(2 marks)

Q4: How does black spot weaken the plant?

A= Reduces the leaves for photosynthesis

(2 marks)

Q5: How can black spot be treated?

A= Fungicides

(1 mark)

Q6: Circle how many cells proteists contain.

One

Two

Three

Ten

Hundreds

A= 1 mark for correct circle.

(1 mark)



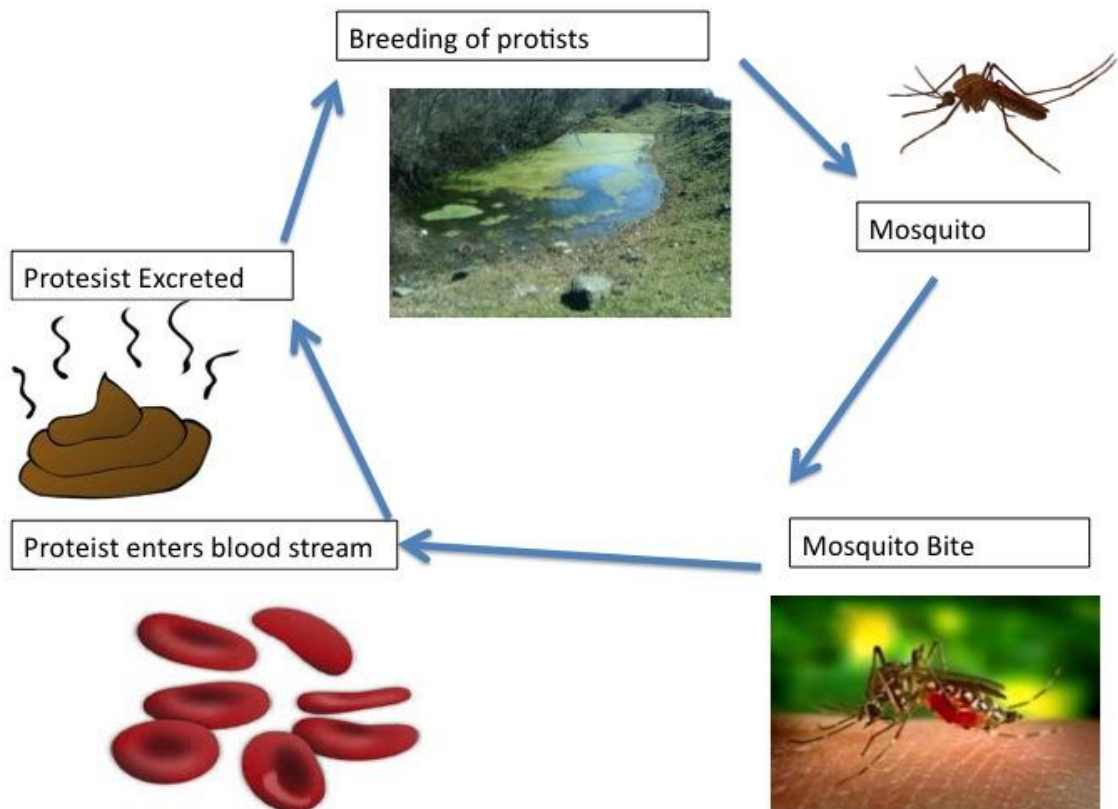
Q7: How is malaria spread?

A= the parasite is spread through carriers (mosquito)

(1 mark)

Q8: Fill in the missing labels in the protists life cycle.

A= Marks awarded each correct label



(5 marks)

Q9: How do the protists reproduce in the human body?

A= Asexually

(1 mark)

Q10: How are the protists passed into the human blood system?

A= during mosquito feeding

(1 mark)

Q11: Discuss how malaria affects the human host.

A= 1 mark for each of the following point:

- Liver damage
- Damage to red blood cells

(2 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q12: i) Discuss the ways in which, the spread of malaria can be controlled.

A= accept any 4 of the following:

- Use insecticides
- Nets
- Remove breeding grounds – eg standing water
- Travellers take antimalarial drugs
- Infertile mosquitos

(4 marks)

ii) Of the methods discussed above what is the cheapest method to control malaria spread in developing countries?

A= Nets

(1 mark)

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# GCSE Science

## GCSE Biology

Fungal and Protist Diseases  
Questions

Name:

**M M E**

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Total Marks: /22

Q1: Name a fungal disease, which affects humans.

---

(1 mark)

Q2: How are plant fungal diseases such as Rose black spot spread?

---

(1 mark)

Q3: Describe the symptoms of rose black spot.

---

---

---

(2 marks)

Q4: How does black spot weaken the plant?

---

---

---

(2 marks)

Q5: How can black spot be treated?

---

(1 mark)

Q6: Circle how many cells proteists contain.

One

Two

Three

Ten

Hundreds

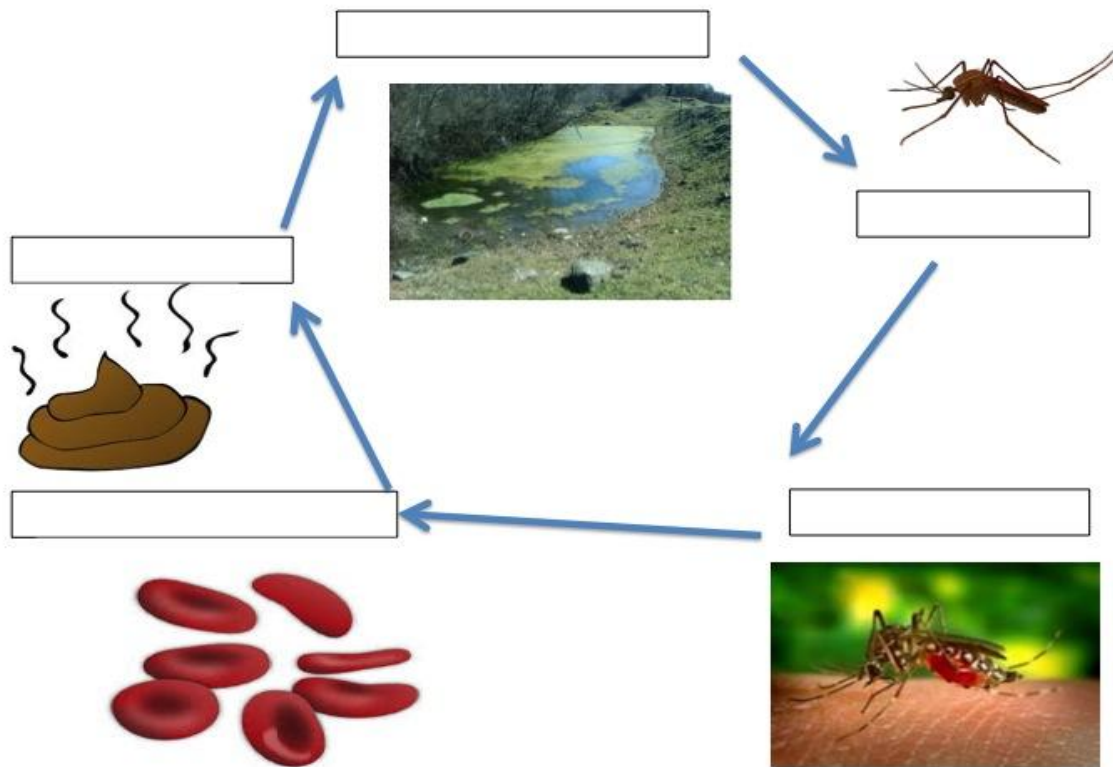
(1 mark)

Q7: How is malaria spread?

---

(1 mark)

Q8: Fill in the missing labels in the protists life cycle.



(5 marks)

Q9: How do the protists reproduce in the human body?

\_\_\_\_\_ (1 mark)

Q10: How are the protists passed into the human blood system?

\_\_\_\_\_ (1 mark)

Q11: Discuss how malaria affects the human host.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2 marks)

Q12: i) discuss the ways in which, the spread of malaria can be controlled.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (4 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

ii) Of the methods discussed above what is the cheapest method to control malaria spread in developing countries?

---

(1 mark)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

Detecting Plant Diseases

Answers

Name:

**M M E**

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Total Marks: /20

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Q1: Give an example of a plant pest acting as a vector for disease.

A= Aphid

(1 mark)

Q2: How is an aphid attack damaging to a plant?

A= Accept any 3 of the following:

- Sharp mouths penetrate phloem
- Large number
- Feed on phloem sap
- Deprive plant of photosynthesis products

(3 marks)

Q3: Give an example of a non-communicable plant disease type.

A= Mineral deficiency

(1 mark)

Q4: Explain the effect a nitrate deficiency will have on a plant.

A= Accept one of the following:

- Limits protein synthesis
- Stunts plant growth

(1 mark)

Q5: A plant shows yellowing leaves. Explain why and how the yellowing has occurred.

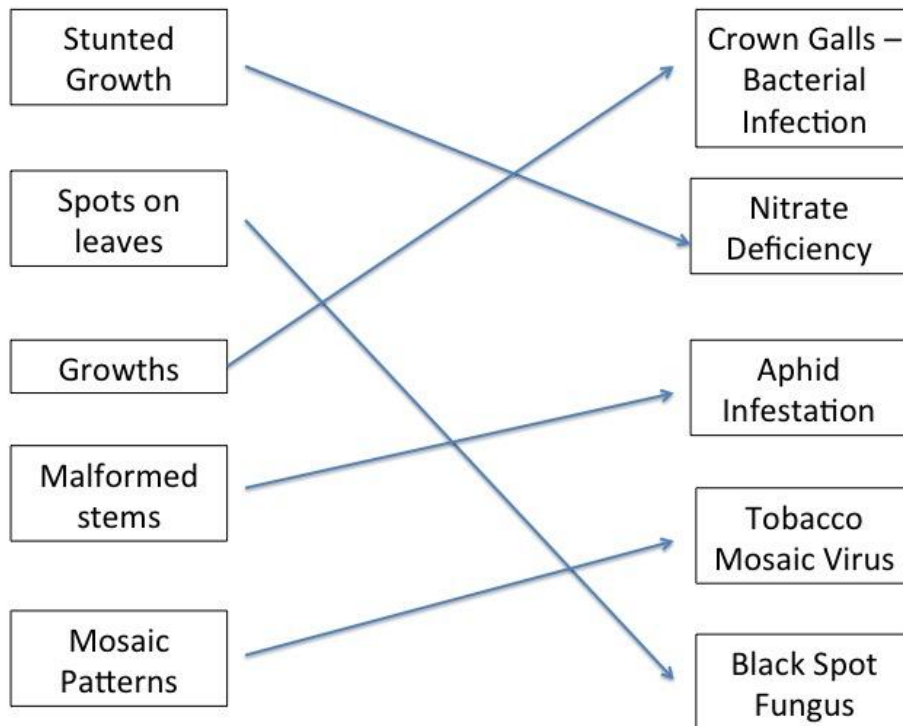
A= 1 mark for each point

- Magnesium ion deficiency
- Can't make chlorophyll
- Can't fully photosynthesise

(3 marks)



Q6: Connect the following symptoms of disease to the correct cause.



A= 1 mark each correct line.

(5 marks)

Q7: Give 2 ways a plant disease can be treated.

A= Accept any 2 of the following:

- Pesticides
- Antifungals
- Mineral additions

(2 marks)

Q8: How can DNA analysis help save a farmers diseased crop?

A= 1 mark for each of the following points:

- ID the causing disease
- Treat more efficiently

(2 marks)

Q9: How can plant cells communicate with each other to inform of diseases.

A= Signalling system

(1 mark)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q10: Why is it important for gardeners to remove diseased plants if they cannot be treated?

A= Prevents spreading.

(1 mark)

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# GCSE Science

## GCSE Biology

### Detecting Plant Diseases Questions

Name:

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Total Marks: /20

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Q1: Give an example of a plant pest acting as a vector for disease.

---

(1 mark)

Q2: How is an aphid attack damaging to a plant?

---

---

---

---

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(3 marks)

Q3: Give an example of a non-communicable plant disease type.

---

(1 mark)

Q4: Explain the effect a nitrate deficiency will have on a plant.

---

(1 mark)

Q5: A plant shows yellowing leaves. Explain why and how the yellowing has occurred.

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---

(3 marks)

Q6: Connect the following symptoms of disease to the correct cause.

Stunted Growth

Crown Galls – Bacterial Infection

Spots on leaves

Nitrate Deficiency

Growths

Aphid Infestation

Malformed stems

Tobacco Mosaic Virus

Mosaic Patterns

Black Spot Fungus

(5 marks)

Q7: Give 2 ways a plant disease can be treated.

---

---

---

---

(2 marks)

Q8: How can DNA analysis help save a farmers diseased crop?

---

---

---

---

(2 marks)

Q9: How can plant cells communicate with each other to inform of diseases.

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(1 mark)

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Q10: Why is it important for gardeners to remove diseased plants if they cannot be treated?

---

(1 mark)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

Human Defence Response  
Answers

Name:

**M M E**

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Total Marks: /18

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Q1: Define what is meant by the human defence response.

A= How we stop bacteria/ pathogens from entering the body.

(1 mark)

Q2: Describe how the skin can defend against pathogens.

A= Accept any 2 of the following:

- Barrier
- Secretions
- Scab/ Clots
- Microorganisms – own naturally occurring

(2 marks)

Q3: Explain how washing your hands can prevent the spread of disease.

A= Washes pathogens from skin surface.

(1 mark)

Q4: How can the respiratory system defend against pathogens?

A= 1 mark – Trap particles

1 mark for any of the following:

- Mucus
- Cilia
- Nasal hairs

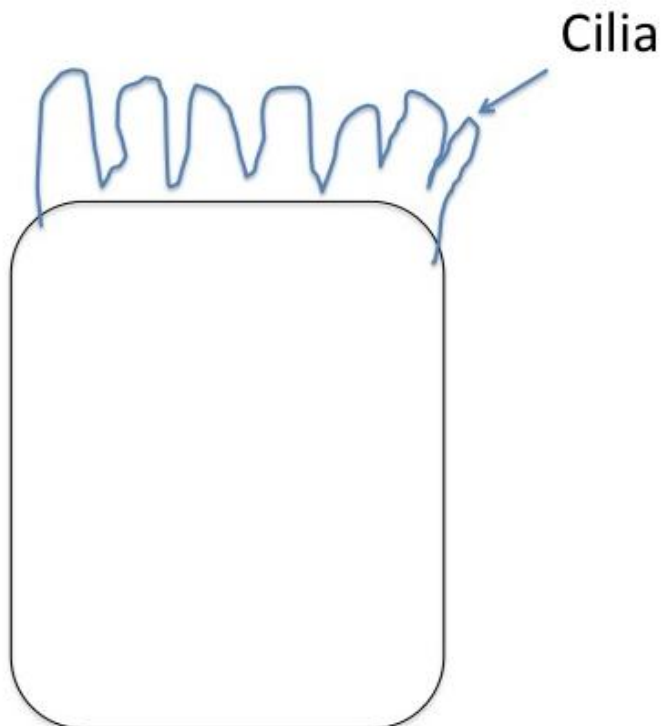
(2 marks)



Q5: Cilia are present in the lungs and beat together to move mucus through the lungs.

Draw and label a cilia cell.

A= 1 mark for drawing/ 1 mark for labelling cilia.



(2 marks)

Q6: Explain how the stomach is adapted to defend against pathogens.

A= Production of stomach acid

(1 mark)

Q7: Clotting is a vital part of the immune system defence to pathogens. Explain the effects on defence seen in those that cannot clot blood effectively.

A= Allows entry point in skin/ Breach 1<sup>st</sup> line of defence.

(1 mark)

Q8: What is an autoimmune disease?

A= Body attacks / Destroys its own tissues.

(1 mark)

Q9: Discuss the ways white blood cells protect against pathogens and how.

A= 3 marks for ways/ 3 marks for how:

- Inject microorganisms
  - Digest
  - Kill
- Produce antibodies
  - – Target particular pathogens
  - Prevent secondary infection
- Produce antitoxins – cancel out toxins

(6 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q10: Explain how antibodies fit to one particular pathogen.

A= Complementary shape.

(1 mark)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

### Human Defence Response Questions

Name:

**M**

**M**

**E**

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Total Marks: /18

Q1: Define what is meant by the human defence response.

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(1 mark)

Q2: Describe how the skin can defend against pathogens.

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(2 marks)

Q3: Explain how washing your hands can prevent the spread of disease.

---

(1 mark)

Q4: How can the respiratory system defend against pathogens?

---

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(2 marks)

Q5: Cilia are present in the lungs and beat together to move mucus through the lungs.  
Draw and label a cilia cell.

(2 marks)

Q6: Explain how the stomach is adapted to defend against pathogens.

\_\_\_\_\_ (1 mark)

Q7: Clotting is a vital part of the immune system defence to pathogens. Explain the effects on defence seen in those that cannot clot blood effectively.

\_\_\_\_\_ (1 mark)

Q8: What is an autoimmune disease?

\_\_\_\_\_ (1 mark)

Q9: Discuss the ways white blood cells protect against pathogens and how.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (6 marks)

Q10: Explain how antibodies fit to one particular pathogen.

\_\_\_\_\_ (1 mark)

**AQA, OCR, Edexcel**

**GCSE Science**

# **GCSE Biology**

## Vaccination Answers

Name:

**M M E**

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Total Marks: /22

Q1: Explain what a vaccine is.

A= Dead/ Inactive pathogen used to develop immunity.

(1 mark)

Q2: Describe the differences in immune response between first infection and secondary infection.

A= 1 mark for each of the following points:

- 1<sup>st</sup> time
  - Get ill
  - Slow response
- 2<sup>nd</sup> time
  - Don't get ill
  - Fast response

(4 marks)

Q3: What is an antigen?

A=foreign substance which induces an immune response

(1 mark)

Q4: What is an antibody?

A= Plasma cell used by the immune system to detect antigens

(1 mark)

Q5: Give 2 examples of diseases, which can be immunised against.

A= Accept any 2 of the following:

- Meningitis
- Tb (Tuberculosis)
- Tetanus
- Polio
- Measles
- Mumps
- Rubella

(2 marks)

Q6: Give an example of a disease which, has been wiped out thorough a successful vaccination program.

A= small pox

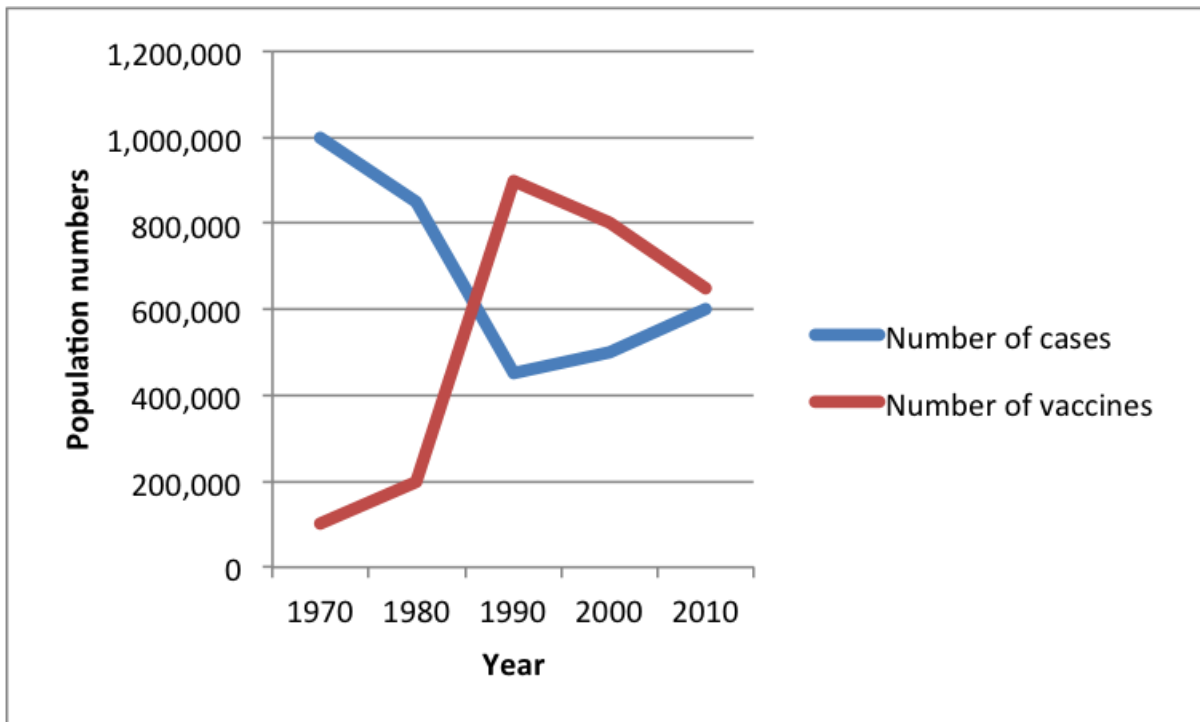
(1 mark)

Q7: Explain why a large vaccine uptake prevents the spread of disease.

A= Less of the population to infect

(1 mark)

Q8: The graph shows the uptake in the Tb vaccine. Discuss the correlation between the number of cases and the uptake of vaccination.



A= 1 mark for each of the following:

- As number of vaccinations increase
- The number of cases decreases.

(2 marks)

Q9: Define what is meant by herd immunity.

A= the immunisation of a population

(1 mark)

Q10: Measles has yet to be eradicated. What percentage herd immunity does the WHO require to declare measles eradicated?

A= 95%

(1 mark)

Q11: Why is measles difficult to herd immunise against to achieve eradication.

A= Accept 2 of the following:

- Requires 2 vaccinations
- High population % needed
- High expense

(2 marks)



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Q12: Developing countries are often difficult to vaccinate in. Explain why.

A= Accept 5 of the following:

- High cost
- Large amounts rural living
- Refrigeration
- Lack of education/ Awareness
- Lack of infrastructure/ Roads
- Lack of hygiene standards

(5 marks)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

### Vaccination Questions

Name:

**M M E**

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Total Marks: /22

Q1: Explain what a vaccine is.

---

(1 mark)

Q2: Describe the differences in immune response between first infection and secondary infection.

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(4 marks)

Q3: What is an antigen?

---

(1 mark)

Q4: What is an antibody?

---

(1 mark)

Q5: Give 2 examples of diseases, which can be immunised against.

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(2 marks)

Q6: Give an example of a disease that has been wiped out through a successful vaccination program.

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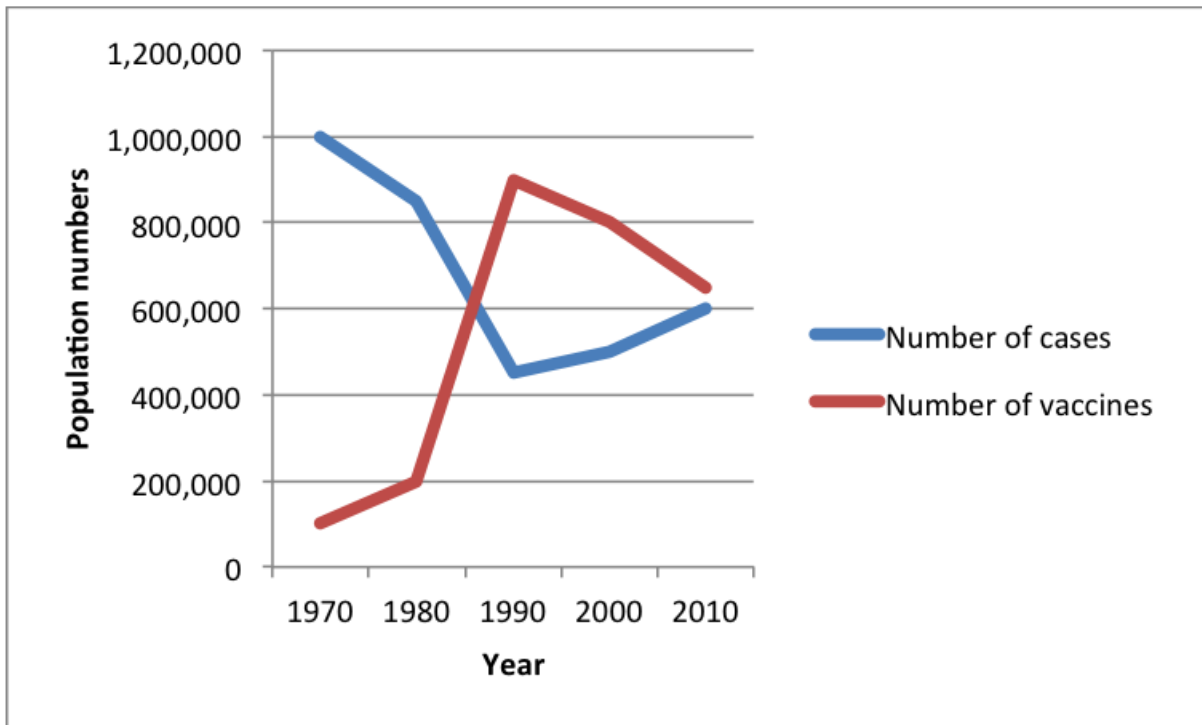
(1 mark)

Q7: Explain why a large vaccine uptake prevents the spread of disease.

---

(1 mark)

Q8: The graph shows the uptake in the Tb vaccine. Discuss the correlation between the number of cases and the uptake of vaccination.



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(2 marks)

Q9: Define what is meant by herd immunity.

---

(1 mark)

Q10: Measles has yet to be eradicated. What percentage herd immunity does the WHO require to declare measles eradicated?

---

(1 mark)

Q11: Why is measles difficult to herd immunise against to achieve eradication.

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(2 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q12: Developing countries are often difficult to vaccinate in. Explain why.

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(5 marks)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

Antibiotics and Painkillers  
Answers

Name:

**M M E**

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Total Marks: /19

Q1: Give an example of a painkiller.

A= accept one of the following:

- Paracetamol
- Aspirin
- Also accept any other valid pain killers

(1 mark)

Q2: State the function of paracetamol in treating a cold.

A= Treats the symptoms not the virus

(1 mark)

Q3: Explain why antibiotics were considered a wonder drug in the 1940's.

A= 1 mark for each of the following points:

- Decreases communicable diseases
- Decreases number of deaths
- Fast acting

(3 marks)

Q4: Explain how antibiotics such as penicillin work.

A= Kill bacteria from inside the body.

(1 mark)

Q5: Describe the main methods of administering antibiotics.

A= 1 mark for each of the following:

- Tablet
- Intravenous (IV) / Straight into the blood stream

(2 marks)

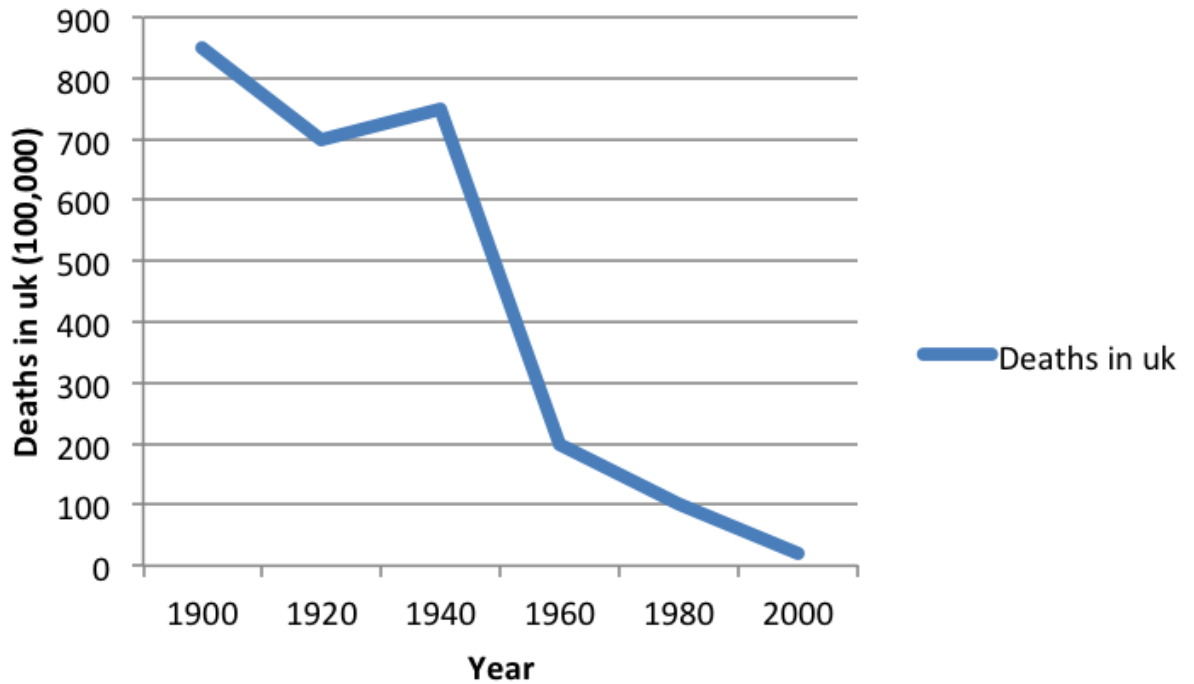
Q6: Explain why when choosing antibiotics they should be specific to the bacterial infection.

A= 1 mark for each of the following:

- More effective
- Prevent resistance

(2 marks)

Q7: Septicaemia was common after childbirth prior to antibiotics. Using the graph below, state the number of deaths, which occurred due to septicaemia in 1900.



A= 850

(1 mark)

Q8: when treating a cold what should a GP prescribe the patient? Circle the correct answer.

A= Painkillers

(1 mark)

Q9: Explain why antibiotics cannot be used to treat viruses.

A= 1 mark for each of the following points:

- Virus reproduce inside the cell
- Antibiotics kill the bacterial cell not the human cell.

(2 marks)

Q10: Explain why it is difficult for scientists to create drugs to treat viruses.

A= Accept any 2 of the following:

- Avoid damaging human/ host cells
- Viruses can evolve quickly
- Viruses can hide from the immune system.

(2 marks)



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Q11: Why are scientists trying to limit the number of antibiotics prescribed?

A= Accept any 3 of the following:

- Reduce number resistant bacteria
- Save for very serious pathogens – e.g. Tb
- Difficult to develop new antibiotics
- Reduce the number of deaths

(3 marks)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

Antibiotics and Painkillers  
Answers

Name:

**M M E**

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Total Marks: /18

Q1: Give an example of a painkiller.

---

(1 mark)

Q2: State the function of paracetamol in treating a cold.

---

(1 mark)

Q3: Explain why antibiotics were considered a wonder drug in the 1940's.

---

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---

---

---

(3 marks)

Q4: Explain how antibiotics such as penicillin work.

---

(1 mark)

Q5: Describe the main methods of administering antibiotics.

---

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---

(2 marks)

Q6: Explain why when choosing antibiotics they should be specific to the bacterial infection.

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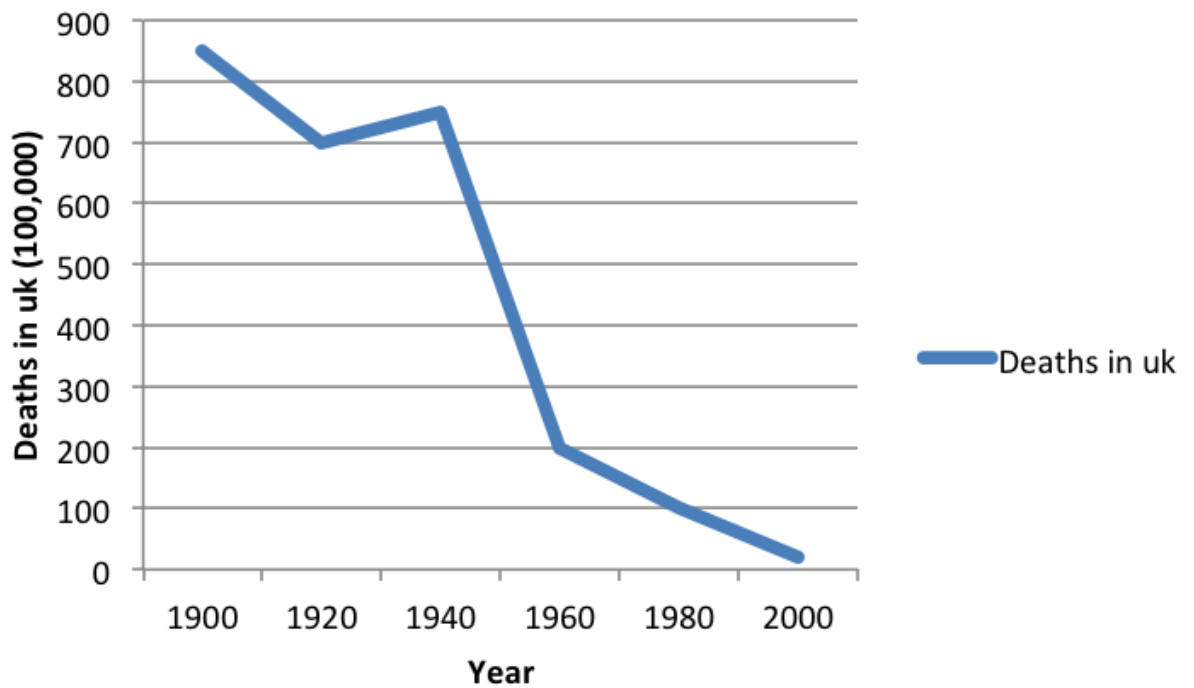
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(2 marks)

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Q7: Septicaemia was common after childbirth prior to antibiotics. Using the graph below, state the number of deaths, which occurred due to septicaemia in 1900.



---

(1 mark)

Q8: when treating a cold what should a GP prescribe the patient? Circle the correct answer.

Painkillers

Antibiotics

(1 mark)

Q9: Explain why antibiotics cannot be used to treat viruses.

---

---

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---

(2 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q10: Explain why it is difficult for scientists to create drugs to treat viruses.

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(2 marks)

Q11: Why are scientists trying to limit the number of antibiotics prescribed.

---

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(3 marks)

**AQA, OCR, Edexcel**

**GCSE Science**

# **GCSE Biology**

## **Drug Development Answers**

Name:

**M**

**M**

**E**

**Mathsmadeeasy.co.uk**

**Total Marks:    /23**

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Q1: Before a new drug can be widely used. What process must occur?

A= Accept any 1 of the following:

- Testing
- Clinical Trials

(1 mark)

Q2: Why are clinical trials vital to drug development?

A= Accept 1 of the following:

- Works well
- Safe as possible

(1 mark)

Q3: Explain what a new drug needs to be considered a good medicine.

A= 1 mark for each of the following:

- Effective – must achieve purpose
- Safe- Limited side effects
- Stable – must be able to store
- Successful uptake and removal from the body.

(4 marks)

Q4: Circle how long it can take to make a new drug available for general use.

12 years

5 years

20 years

2 years

10 years

(1 mark)

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Q5: What term is used when describing if a drug does its job?

A= Efficiency

(1 mark)

Q6: Once a drug has been chemically tested, what is required before a drug can be tested on humans?

A= Animal testing

(1 mark)

Q7: Discuss the stages of preclinical testing.

A= Accept either Cell/ Tissues (1)

- Live animals (1)

(2 marks)

Q8: Explain how clinical trials of new drugs are carried out.

A= Accept any 5 of the following:

- Use healthy volunteers/ Patients
- 1<sup>st</sup> give low dose – side effects
- Given to small numbers of patients – check it treats disease
- Test on larger numbers – determine dose
- Legal tests – licence for use
- Monitor long term effects – safety

(5 marks)

Q9: Define what a placebo is.

A= A substance that has no physical effect and used to check physiological effect of a drug.

(1 mark)

Q10: Clinical Trials rely on double blind study's to see how effective their new drugs are. Explain how a double blind study is carried out.

A= Accept any 4 of the following:

- Use target disease patients
- Some get placebo/ some new medicine
- Patients allocated randomly
- Doctor and patients don't know which group
- Monitor groups carefully.

(4 marks)



Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q11: Explain why results clinical trials are published and why.

A= 1 mark for each of the following:

- Peer review
- Prevent false results/ claims

(2 marks)

**AQA, OCR, Edexcel**

**GCSE Science**

# **GCSE Biology**

## **Drug Development Questions**

Name:

**M M E**

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Total Marks: /23

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Q1: Before a new drug can be widely used. What process must occur?

---

(1 mark)

Q2: Why are clinical trials vital to drug development?

---

(1 mark)

Q3: Explain what a new drug needs to be considered a good medicine.

---

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(4 marks)

Q4: Circle how long it can take to make a new drug available for general use.

12 years

5 years

20 years

2 years

10 years

(1 mark)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q5: What term is used when describing if a drug does its job?

\_\_\_\_\_ (1 mark)

Q6: Once a drug has been chemically tested, what is required before a drug can be tested on humans?

\_\_\_\_\_ (1 mark)

Q7: Discuss the stages of preclinical testing.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (2 marks)

Q8: Explain how clinical trials of new drugs are carried out.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (5 marks)

Q9: Define what a placebo is.

\_\_\_\_\_  
\_\_\_\_\_ (1 mark)

Q10: Clinical Trials rely on double blind study's to see how effective their new drugs are. Explain how a double blind study is carried out.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (4 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q11: Explain why results clinical trials are published and why.

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(2 marks)

**AQA, OCR, Edexcel**

# GCSE Science

## GCSE Biology

### Drug Discovery Answers

Name:

**M M E**

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Total Marks: /22

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q1: Where were drugs traditionally extracted?

A= Plants

(1 mark)

Q2: Digitalis is a heart medication. What plant was the drug originally extracted from?

A= Foxgloves

(1 mark)

Q3: What can a drug become if given in large quantities?

A= Poison/poisonous

(1 mark)

Q4: Aspirin is a type of painkiller from what plant is the compound originally extracted from?

A= Willow

(1 mark)

Q5: Aspirin has been used to treat pain and inflammation since 400 BC. Explain why it is still a popular painkiller.

A= Accept any 2 of the following:

- Cheap
- Few side effects
- Multiple uses

(2 marks)

Q6: Discuss how Alexander Fleming discovered penicillin.

A= Accept any 3 of the following:

- Clear ring of gel around his mould cultures (no growth around cultures)
- Something had killed the mould
- Cross contamination of his work
- Uses a mould (penicillin) to kill bacteria

(3 marks)

Q7: Why was the discovery of penicillin important?

A= Accept any 3 of the following:

- 1<sup>st</sup> antibiotic
- Used in WWII – helped the war effort
- Changed future of medicine
- Saved many lives from communicable diseases

(3 marks)

Q8: Explain why the production of synthetic forms of drugs are preferred to plant extracts.

A= Accept any 2 of the following:

- Purer compound
- No other interacting compounds
- Keeps the natural resource
- No limit on the final drug supply

(2 marks)

Q9: Discuss ways new drugs are being discovered.

A= Accept any 5 of the following:

- Computer models
- Synthesised chemicals
- Examining wild plants
- Research into making wild extractions more efficient
- Soil
- Microorganisms

(5 marks)

Q10: A new antibiotic has been discovered in soil and has shown great effectiveness.

Why is this a promising antibiotic development?

A= 1 mark for each of the following points:

- Can use a resistant bacteria
- E.g. MRSA

(2 marks)

Q11: Why is antibiotic discovery using soil difficult?

A= Difficult to culture/ grow

(1 mark)



**AQA, OCR, Edexcel**

**GCSE Science**

# **GCSE Biology**

**Drug Discovery Questions**

Name:

**M M E**

**Mathsmadeeasy.co.uk**

**Total Marks: /22**

Q1: Where were drugs traditionally extracted?

---

(1 mark)

Q2: Digitalis is a heart medication. What plant was the drug originally extracted from?

---

(1 mark)

Q3: What can a drug become if given in large quantities?

---

(1 mark)

Q4: Aspirin is a type of painkiller from what plant is the compound originally extracted from?

---

(1 mark)

Q5: Aspirin has been used to treat pain and inflammation since 400 BC. Explain why it is still a popular painkiller.

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(2 marks)

Q6: Discuss how Alexander Fleming discovered penicillin.

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(3 marks)

Visit <http://www.mathsmadeeasy.co.uk/> for more fantastic resources.

Q7: Why was the discovery of penicillin important?

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(3 marks)

Q8: Explain why the production of synthetic forms of drugs are preferred to plant extracts.

---

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---

(2 marks)

Q9: Discuss ways new drugs are being discovered.

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(5 marks)

Q10: A new antibiotic has been discovered in soil and has shown great effectiveness. Why is this a promising antibiotic development?

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(2 marks)

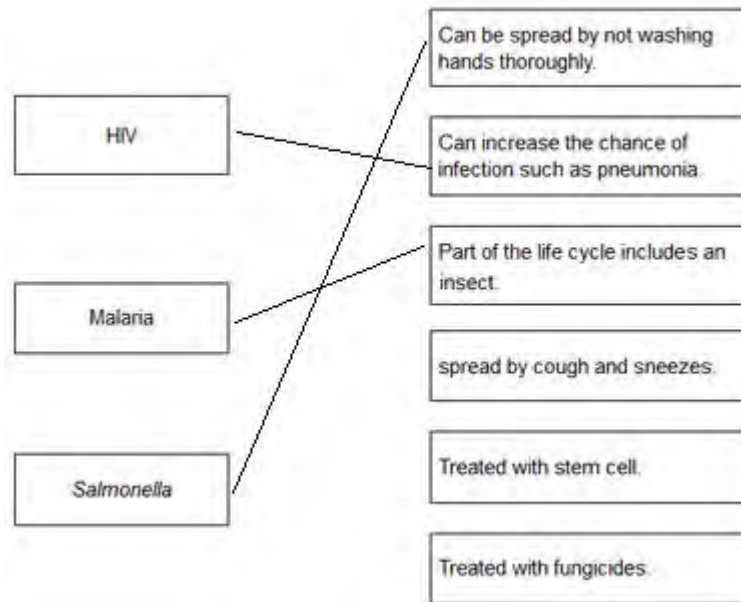
Q11: Why is antibiotic discovery using soil difficult?

---

(1 mark)

M1.

(a)



*each extra line negates a mark*

4

1

1

(b) pain when urinating

1

yellow discharge

1

(c) three correct plots

*allow 1 mark for two correct plots*

2

correctly drawn line

1

(d) any **three** from:

- (fairly) level / steady up to 2009  
*allow numbers of males fall (slightly) and females rise (slightly) up to 2009*
- (there is a) rise after 2009
- males are (always) higher than females
- males rising faster than females  
*allow overall increase (from 2005 to 2013)*

3

(e) HIV is a virus

1

(and) antibiotics are only effective against bacteria

**or**

antibiotics do not kill viruses

*allow viruses live inside cells*

1

[13]

**M2.** (a) (i) 25°C 1

(ii) pathogens 1

(b) **D** 1

more / most bacteria killed  
*accept biggest area / ring where no bacteria are growing* 1

(c) viruses live inside cells 1

**[5]**

**M3.** (a) 40 – 60 hours 1

(b) (i) decrease 1

1<sup>st</sup> slowly then faster / appropriate detail from the graph – e.g. from 7.8 to 0 / faster after 4 – 10h 1

(ii) oxygen after glucose  
*extra box ticked cancels 1 mark* 1

oxygen less than glucose 1

(iii) respiration 1

**[6]**

<b>M4.</b>	(a)	antibodies	1
		antitoxins	1
		antibiotics	1
	(b)	any <b>two</b> from:	
		• measles	
		• mumps	
		• rubella / German measles	2
	(c)	less / low / no chance of getting named or all condition(s) if vaccinated	1
		quantitative figure(s) eg 5 times less likely to get convulsions	1

[7]



- M5.** (a) pathogens 1
- (b) (i) A disease affecting people in many countries 1
- (ii) birds fly / migrate  
*accept converse*
- OR
- human contact with birds more likely  
*birds not contained / difficult to control movement*
- OR
- there are more birds (than pigs) 1
- (c) (i) antibiotics (only) kill bacteria  
*ignore flu is caused by a virus unqualified*
- OR
- antibiotics don't kill viruses  
*ignore virus resistant / immune* 1
- (ii) painkillers  
*accept any correct named painkiller, eg aspirin or paracetamol*  
*allow antivirals / Tamiflu*  
*ignore medicine / tablets* 1
- (iii) resistant 1
- bacteria 1
- in this order*

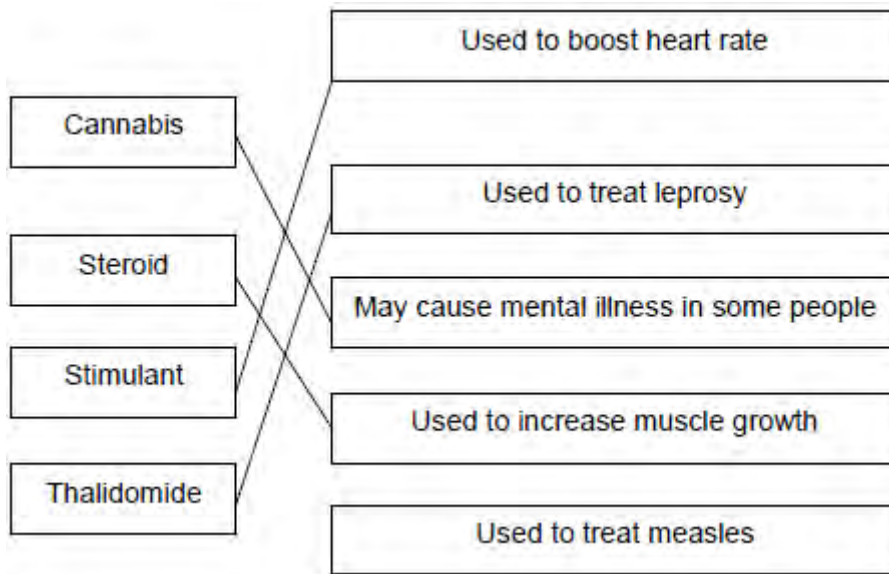
- M6.** (a) leprosy  
*allow bone / blood cancer*  
*ignore cancer* 1
- (b) (i) 6 / six 1
- (ii) from 1120 to 5600  
*allow from 5600 to 1120*  
*allow 4480 (alone)* 1
- (c) any **one** from:  
*ignore side effects, eg allergies*  
*ignore safety / harm unqualified*
- (test for) toxicity  
*allow poisonous*
  - (test for) dosage  
*allow idea of amount*
  - (test for) efficacy.  
*allow to see if it works*  
*allow to check for interaction with other drugs* 1
- (d) (i) any **two** from:  
*ignore reference to cost / addiction*
- more people take / use legal / non-prescribed drugs
  - legal / non-prescribed drugs are (more) readily available
  - alcohol causes liver / brain damage
- or**  
 tobacco causes cancer.  
*allow harmful effects of other named legal non-prescribed drugs* 2

- (ii) addiction / dependency  
*allow withdrawal or examples of symptoms of withdrawal (if attempting to stop)*

1

[7]

M7.(a)



extra line from any drug cancels that mark

4

(b) (i) any **one** from:

- (live) animals  
*accept named examples, eg mice*  
*ignore people / volunteers*
- cells
- tissues  
*do **not** allow plants*

1

(ii) to check that the drug works

1

to find the best dose to use

1

(iii) only scientists at the drug company

1

(c) (i) 420

1

(ii) statin(s)

1

(iii) any **one** from:

- side effects  
*allow cost*
- other medication  
*allow patient choice*
- other (medical) conditions  
*allow family history or age*

1

[11]

**Q1.**Microorganisms can cause disease.

(a) Draw **one** line from each disease to the correct description.

HIV	Can be spread by not washing hands thoroughly.
Malaria	Can increase the chance of infection such as pneumonia.
Salmonella	Part of the life cycle include an insect.
	spread by cough and sneezes.
	Treated with stem cell.
	Treated with fungicides.

(3)

(b) Gonorrhoea is a sexually transmitted disease.

A bacterium causes gonorrhoea.

What are the symptoms of gonorrhoea?

Tick **two** boxes.

Headache

Pain when urinating

Rash

Vomiting

Yellow discharge



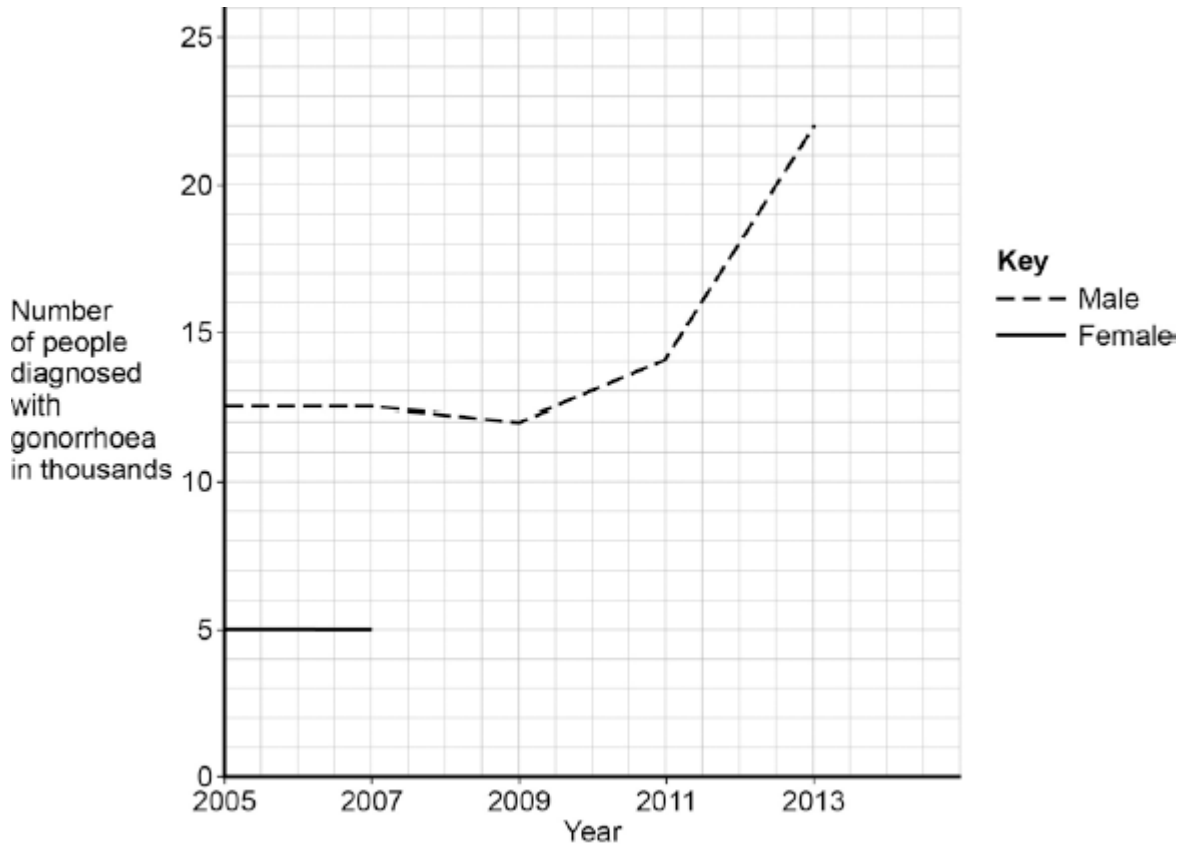
(2)

- (c) The table below shows the number of people in the UK diagnosed with gonorrhoea in different years.

<b>Number of people diagnosed with gonorrhoea in thousands</b>		
<b>Year</b>	<b>Female</b>	<b>Male</b>
2005	5.0	12.5
2007	5.0	12.5
2009	5.5	12.0
2011	6.0	14.0
2013	7.5	22.0

Use the data in the table to complete the graph below.

- The numbers for males have already been plotted.
- Only some of the numbers for females have been plotted.



(3)

- (d) Describe the patterns in the numbers of males and females with gonorrhoea from 2005 to 2013.

Use the data in the graph.

.....

.....

.....

.....

.....

(3)

- (e) Gonorrhoea is treated with an antibiotic.

HIV is another sexually transmitted disease.

Explain why prescribing an antibiotic will **not** cure HIV.



.....  
.....  
.....  
.....

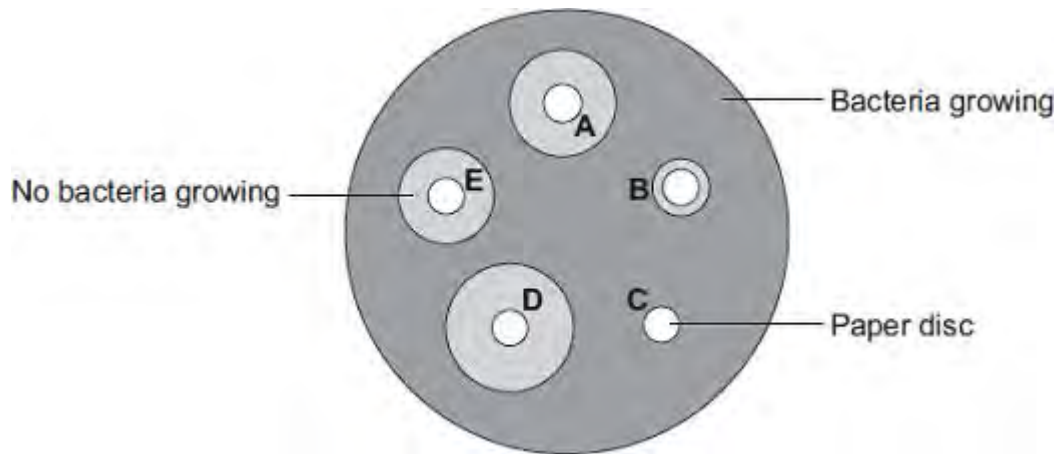
(2)  
(Total 13 marks)

**Q2.** Students in a school investigated the effect of five different antibiotics, **A**, **B**, **C**, **D** and **E**, on one type of bacterium.

The students:

- grew the bacteria on agar jelly in a Petri dish
- soaked separate paper discs in each of the antibiotics
- put the paper discs onto the bacteria in the Petri dish
- put the Petri dish into an incubator.

The diagram shows what the Petri dish looked like after 3 days.



- (a) (i) What is the maximum temperature the incubator should be set at in the school?

Draw a ring around your answer.

**10°C 25°C 50°C**

(1)

- (ii) Draw a ring around the correct answer to complete the sentence.

The incubator should **not** be set at a higher temperature because the higher

temperature might help the growth of

pathogens.
toxins.
viruses.

(1)

- (b) Which antibiotic, **A**, **B**, **C**, **D** or **E**, would be best to treat a disease caused by this type of bacterium?

Write your answer in the box.

Give the reason for your answer.

.....  
.....

(2)

- (c) Antibiotics **cannot** be used to treat diseases caused by viruses.

Why?

Tick (✓) **one** box.

Viruses are not pathogens

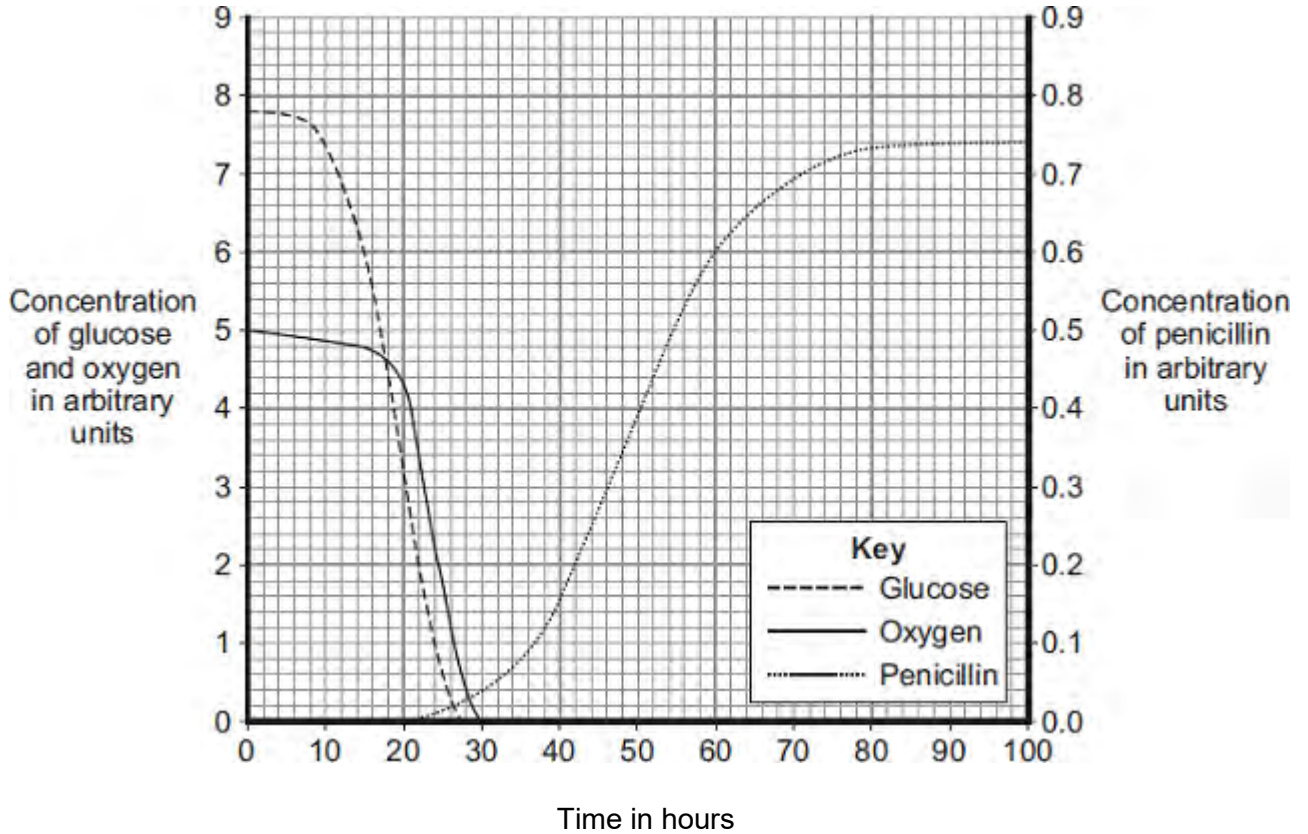
There are too many different types of virus

Viruses live inside cells

(1)  
(Total 5 marks)

**Q3.** The mould *Penicillium* can be grown in a fermenter. *Penicillium* produces the antibiotic penicillin.

The graph shows changes that occurred in a fermenter during the production of penicillin.



(a) During which time period was penicillin produced most quickly?

Draw a ring around **one** answer.

**0 – 20 hours**

**40 – 60 hours**

**80 – 100 hours**

(1)

(b) (i) Describe how the concentration of glucose in the fermenter changes between 0 and 30 hours.

.....

.....

.....

.....

(2)

- (ii) How does the change in the concentration of oxygen in the fermenter compare with the change in concentration of glucose between 0 and 30 hours?

Tick (✓) **two** boxes.

The oxygen concentration changes after the glucose concentration.

The oxygen concentration changes before the glucose concentration.

The oxygen concentration changes less than the glucose concentration.

The oxygen concentration changes more than the glucose concentration.

(2)

- (iii) What is the name of the process that uses glucose?

Draw a ring around **one** answer.

**distillation**

**filtration**

**respiration**

(1)

(Total 6 marks)

**Q4.** (a) Use words from the box to complete the sentences about curing disease.

<b>antibiotics</b>	<b>antibodies</b>	<b>antitoxins</b>	<b>painkillers</b>	<b>statins</b>
--------------------	-------------------	-------------------	--------------------	----------------

The substances made by white blood cells to kill pathogens are called .....

The substances made by white blood cells to counteract poisons produced by pathogens are called .....

Medicines which kill bacteria are called .....

(3)

(b) The MMR vaccine protects people against three diseases.

Write down the names of **two** of these diseases.

1 .....

2 .....

(2)

(c) All vaccinations involve some risk.

The table shows the risk of developing harmful effects:

- from the disease if a child is **not** given the MMR vaccine
- if a child **is** given the MMR vaccine.

Harmful effect	Risk of developing the harmful effect from the disease if not given the MMR vaccine	Risk of developing the harmful effect if given the MMR vaccine
Convulsions	1 in 200	1 in 1000
Meningitis	1 in 3000	Less than 1 in 1 000 000
Brain damage	1 in 8000	0

A mother is considering if she should have her child vaccinated with the MMR vaccine.

Use information from the table to persuade the mother that she should have her child vaccinated.

.....

.....

.....

.....

.....

(2)  
(Total 7 marks)

**Q5.** Viruses and bacteria cause diseases in humans.

(a) Draw a ring around the correct word to complete the sentence.

Organisms that cause disease are called

- |            |
|------------|
| algae.     |
| pathogens. |
| vaccines.  |

(1)

(b) In August 2011 the United Nations gave a warning that there was a new strain of the bird flu virus in China.

Bird flu may kill humans. The new strain of the bird flu virus could cause a *pandemic* very quickly.

(i) What is a *pandemic*?

Tick (✓) **one** box.

A disease affecting the people all over one country.

A disease affecting hundreds of people.

A disease affecting people in many countries.

(1)

(ii) The swine flu virus is carried by pigs.

The bird flu virus is likely to spread much more quickly than the swine flu virus.

Suggest **one** reason why.

.....  
.....

(1)



This notice is from a doctor's surgery.

**Unfortunately,  
antibiotics  
will NOT get  
rid of your flu.**

- (c) (i) Why will antibiotics **not** get rid of flu?

.....  
.....

(1)

- (ii) The symptoms of flu include a sore throat and aching muscles.  
What would a doctor give to a patient to relieve the symptoms of flu?

.....

(1)

- (iii) It is important that antibiotics are **not** overused.

Explain why.

Use words from the box to complete the sentence.

**antibody    bacteria    immune    resistant    viruses**

Overuse of antibiotics might speed up the development

of ..... strains of .....

(2)

(Total 7 marks)

**Q6.** Many people in the UK take sleeping pills.

- (a) The drug thalidomide was developed as a sleeping pill in the 1950s. In the 1960s thalidomide was banned. Recently thalidomide has been used to treat other diseases.

Name **one** disease thalidomide is used to treat now.

.....

(1)

- (b) The table shows information about the development of a new sleeping pill.

Type of test or trial	Preclinical	Clinical phase 1	Clinical phase 2	Clinical phase 3
Tested or trialled on	Cells, tissues or animals	20 – 100 healthy volunteers	100 – 500 volunteer patients	1000 – 5000 volunteer patients
Number of compounds tested	>10 000	5 – 10	2 – 3	1 (new sleeping pill)
Time taken for test or trial in years	1 – 4	2 – 4	1 – 3	2 – 4

- (i) What is the shortest time taken to develop a new sleeping pill?

..... years

(1)

- (ii) What is the **range** for the number of volunteers needed to complete all the clinical trials for the new sleeping pill?

.....

(1)

- (c) Drugs are trialled to check for side effects on people.

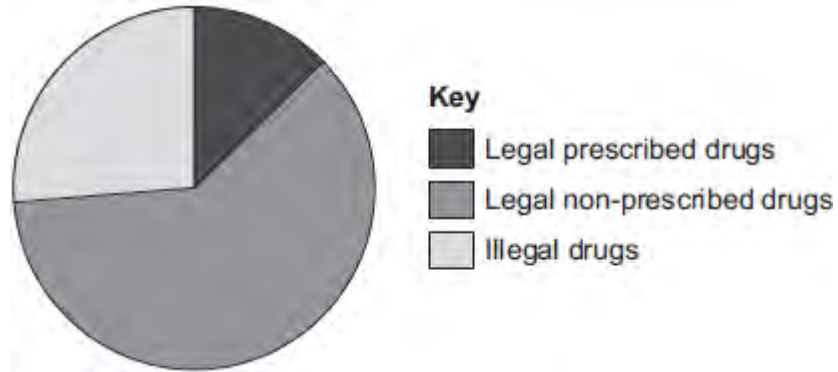
Give **one** other reason why drugs are trialled.

.....

.....

(1)

- (d) The pie chart shows the impact on the health of the population caused by drugs from different sources.



- (i) Legal non-prescribed drugs have a greater impact on the health of the population than illegal drugs.

Suggest **two** reasons why.

.....

.....

.....

.....

.....

.....

(2)

- (ii) Drugs change chemical processes in a person's body.

Why is it difficult for a person to stop taking certain drugs?

.....

.....

(1)

(Total 7 marks)

**Q7.** Drugs affect the human body.

(a) Draw **one** line from each drug to the correct information about the drug.

Drug	Information
Cannabis	Used to boost heart rate
Steroid	Used to treat leprosy
Stimulant	May cause mental illness in some people
Thalidomide	Used to increase muscle growth
	Used to treat measles

(4)

(b) New drugs must be tested and trialled before being used.

(i) New drugs are tested in a laboratory before they are trialled on people.

What are new drugs tested on in a laboratory?

.....

(1)

(ii) Why is it important that drugs are trialled before doctors give them to patients?

Tick (✓) **two** boxes.

To check that the drug works

To check the cost of the drug

To find out if the drug is legal

To find the best dose to use

(2)

(iii) In a double blind drug trial, only some people know which patients have been given the drug.

Who knows which patients have been given the drug?

Tick (✓) **one** box.

The patient and the doctor

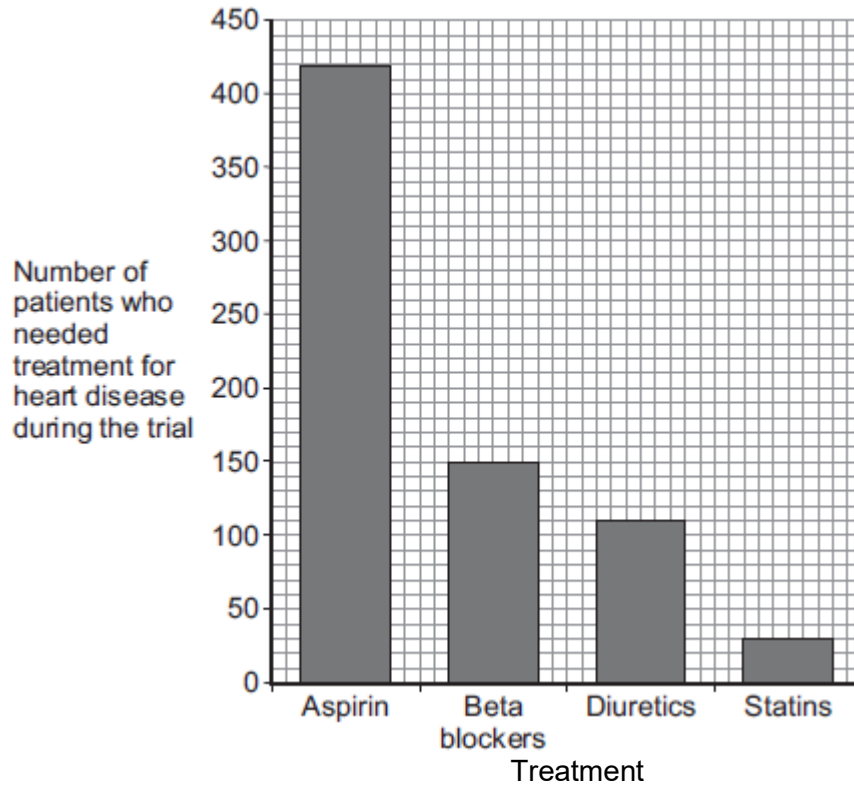
Only the doctor

Only scientists at the drug company

(1)

(c) Doctors trialled four different treatments for reducing the risk of heart disease. Each treatment was trialled on the same number of patients for 5 years. The patients did **not** have heart disease at the start of the trial.

The graph below shows the results.



- (i) How many patients who took aspirin needed treatment for heart disease during the trial?

Number of patients = .....

(1)

- (ii) Based **only** on the evidence in the graph, which would be the best treatment to reduce the risk of developing heart disease?

.....

(1)

- (iii) Suggest **one** other factor that a doctor might consider before deciding which treatment to use for a patient.

.....

(1)

(Total 11 marks)

**M1.(a)** any **two** from:

- only one 'chromosome'  
*allow one strand of DNA*
- circular  
*allow loop*
- may have plasmids
- not in a nucleus / no nucleus

2

(b) (i) any **one** from:

- London is much higher  
*or converse*
- more variable / wider range  
*allow 'on average it is 5 / 6 times greater'*

1

(ii) increases

*Included figures must be correct*

1

(iii) overall slight increase

*accept 'doesn't change much'*

1

variable / goes up and down

1

(c) (i) both axes correctly labelled

x = Year

y = Number of cases

1

correct points

*all correct = 2 marks*

*1-2 errors = 1 mark*

*> 2 errors = 0 marks*

2

suitable line of best fit

*accept straight line or smooth curve*

1

(ii) doesn't fit the pattern / line of best fit

1

(d) provides immunity / protection (to TB)

*ignore 'stops people catching it'*

*ignore 'resistance'*

1

prevents TB spreading

*accept ref to herd immunity*

1

[13]



- M2.** (a) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the [Marking guidance](#), and apply a 'best-fit' approach to the marking.

**0 marks**No relevant content.

**Level 1 (1-2 marks)**There is a brief description of at least one of the stages (pre-inoculation, inoculation, post-inoculation).

**Level 2 (3-4 marks)**There is a simple description of at least two stages and an explanation of at least one of them.

**Level 3 (5-6 marks)**There is a clear description of all three stages and an explanation of at least two of them.

**Examples of Biology points made in the response:**

***Pre-inoculation***

- Petri dish and agar sterilised before use
- to kill unwanted bacteria
- inoculating loop passed through flame / sterile swab
- to sterilise / kill (other) bacteria

***Inoculation***

- loop/swab used to spread/streak bacterium onto agar

*Allow other correct methods, eg bacterial lawns*

- lid of Petri dish opened as little as possible
- to prevent microbes from air entering

***Post-inoculation***

- sealed with tape
- to prevent microbes from air entering

- incubate
- to allow growth of bacteria

6

(b) (i) bacteria killed / destroyed  
*ignore fights / attacks / stops growth / got rid of*

1

(ii) *Might be correct*

largest area / space where no bacteria are growing  
*allow most bacteria killed*

1

*Might not be correct*

(need more evidence as) D may be harmful to people / animals / surfaces

*ignore ref to cost / dangerous or harmful unqualified*

1

**or** may work differently with different bacteria

**or** disinfectants may be different concentrations

*ignore different amounts of disinfectant unless reference to different drop size*

**or** may not last as long

*ignore take longer to work*

*allow reference to anomalous result or not repeated*

[9]

**M3.** (a) mumps

*in either order rubella / German measles  
both needed for the mark  
ignore measles unqualified*

1

(b) (i) 80(.0)

*allow 1 mark for  $\frac{504}{630}$  or 0.8*

2

(ii) less chance of epidemic / pandemic

**or**

*less chance of spread of disease / measles / mumps / rubella*

*allow idea of herd immunity (increased protection for those  
who are not vaccinated)*

*ignore less chance of getting the disease or to eradicate the  
disease*

1

(c) (i) dead / inactive pathogens / viruses / bacteria

*allow antigens / proteins from pathogens / viruses / bacteria  
ignore microorganisms*

1

(ii) white blood cells produce antibodies

1

*antibodies produced rapidly (on re-infection) or response rapid (on  
re-infection)*

*allow ecf if antibodies incorrectly identified in first marking  
point*

1

*these antibodies kill pathogens / viruses / bacteria*

*do **not** accept idea that original antibodies remain in blood*

*and kill pathogens*

1

- (d) (i) antibiotics don't kill viruses  
*allow antibiotics only kill bacteria*

1

(because measles) virus / pathogen lives inside cells  
*allow antibiotics do not work inside cells or killing virus /  
pathogen would kill / damage cell*

1

- (ii) (bacteria / pathogens) develop resistance (to antibiotic)  
*ignore reference to immunity  
ignore viruses develop resistance*

1

[11]

**M4.** (a) to kill virus  
**or**  
to prevent virus spreading 1

(b) take (stem) cells from meristem  
**or**  
tissue culture  
*allow take cuttings* 1

(c) use Benedict's solution 1

glucoses turns solution blue to orange 1

(d) **Level 2 (3–4 marks):**  
A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points that explain why plants with TMV have stunted growth.

**Level 1 (1–2 marks):**  
Simple statements are made, but not precisely. The logic is unclear.

**0 marks:**  
No relevant content.

**Indicative content**

- less photosynthesis because of lack of chlorophyll
- therefore less glucose made  
so
- less energy released for growth
- because glucose is needed for respiration  
and / or
- therefore less amino acids / proteins / cellulose for growth
- because glucose is needed for making amino acids / proteins / cellulose

4

[8]

**M5.**

(a) any **two** from:

- acid in the stomach kills pathogens in food
  - skin forms a barrier / produces antimicrobial secretions
  - hairs in the nose trap (particles which may contain) pathogens
  - trachea / bronchi has mucus which traps pathogens
- or**
- bronchi have cilia which waft mucus to throat to be swallowed

2

(b) **Level 3 (5–6 marks):**

A clear, logical and coherent answer, with no significant redundancy. The student understands the process and links this to reasons for clinical trials.

**Level 2 (3–4 marks):**

A partial answer with errors and ineffective reasoning or linkage.

**Level 1 (1–2 marks):**

One or two relevant points but little linkage of points or logical reasoning.

**0 marks:**

No relevant content.

**Indicative content**

- pre-clinical trials of the new drug on cells / tissues / live animals
- to test toxicity, dosage and efficacy
- clinical trials / test on healthy volunteers and Ebola patients at very low doses
- so that you can monitor for safety / side effects
- and only then do trials to find the optimum dosage and test for efficacy
- double blind trial / use of placebo
- which does not contain the new drug
- random allocation of Ebola patients to groups
- so no one knows who has placebo / the new drug
- peer review of data
- to help prevent false claims

6

[8]

**M6.** (a) 55%

*2 marks for correct answer alone*

*accept 54 – 56*

*5.5 / 10 × 100 alone gains 1 mark*

2

(b) any **three** from:

- amino acids
- antibodies
- antitoxins
- carbon dioxide
- cholesterol
- enzymes
- fatty acid
- glucose
- glycerol
- hormones / named hormones
- ions / named ions
- proteins
- urea
- vitamins
- water.

*ignore blood cells and platelets*

*ignore oxygen*

*max 1 named example of each for ions and hormones*

*allow minerals*

3

(c) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1 – 2 marks)**

There is a description of pathogens with errors or roles confused.

**or**

the immune response with errors or roles confused.

**Level 2 (3 – 4 marks)**

There is a description of pathogens **and** the immune response with some errors or confusion

**or**

a clear description of either pathogens **or** the immune response with few

errors or little confusion.

**Level 3 (5 – 6 marks)**

There is a good description of pathogens **and** the immune response with very few errors or omissions.

**Examples of biology points made in the response:**

- bacteria and viruses are pathogens  
*credit any ref to bacteria and viruses*
- they reproduce rapidly inside the body
- bacteria may produce poisons / toxins (that make us feel ill)
- viruses live (and reproduce) inside cells (causing damage).

white blood cells help to defend against pathogens by:

- ingesting pathogens / bacteria / (cells containing) viruses  
*credit engulf / digest / phagocytosis*
- to destroy (particular) pathogen / bacteria / viruses
- producing antibodies
- to destroy particular / specific pathogens
- producing antitoxins
- to counteract toxins (released by pathogens)  
*credit memory cells / correct description*
- this leads to immunity from that pathogen.

6

[11]



**Q1.**Some infections are caused by bacteria.

- (a) The genetic material is arranged differently in the cells of bacteria compared with animal and plant cells.

Describe **two** differences.

.....

.....

.....

.....

(2)

- (b) Tuberculosis (TB) is an infection caused by bacteria.

The table below shows the number of cases of TB in different regions of southern England from 2000–2011.

**Number of cases of TB per 100 000 people**

Year	London	South East	South West
2000	37	5	3
2001	36	6	4
2002	42	6	6
2003	42	7	4
2004	42	7	5
2005	49	8	5
2006	44	8	3
2007	43	8	5
2008	44	8	5
2009	44	9	6
2010	42	9	5
2011	45	10	5

(i) How does the number of cases of TB for London compare with the rest of southern England?

.....  
.....  
.....

(1)

(ii) Describe the pattern in the data for cases of TB in the South East.

.....  
.....

(1)

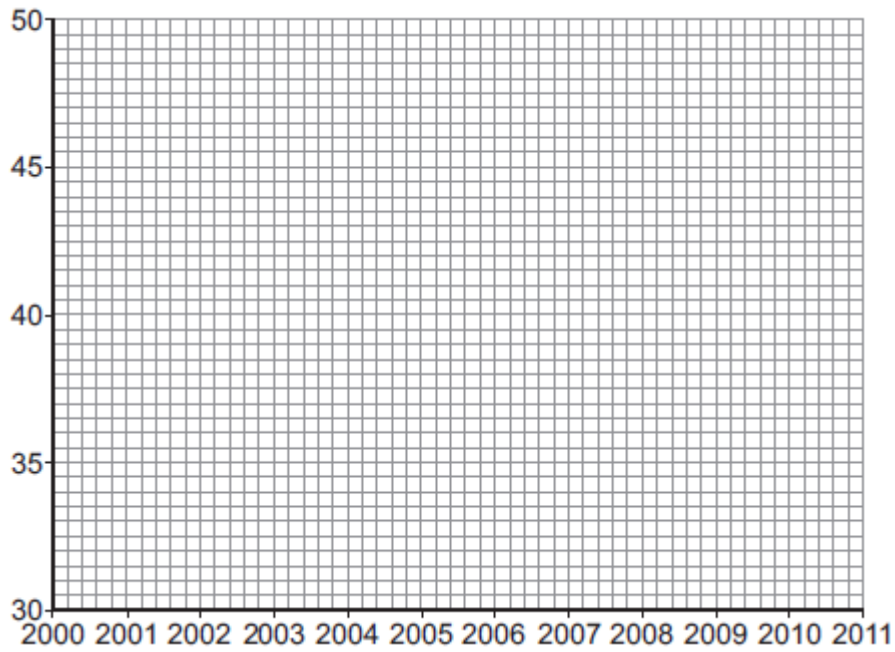
(iii) Describe the pattern in the data for cases of TB in the South West.

.....  
.....  
.....  
.....

(2)

(c) (i) On the graph paper below:

- plot the number of cases of TB in **London**
- label both the axes on the graph
- draw a line of best fit.



(4)

(ii) Suggest why a student thought the value for 2005 in London was anomalous.

.....  
 .....

(1)

(d) People can be vaccinated against TB.

Suggest how a vaccination programme would reduce the number of people with TB.

Details of how a vaccine works are **not** required.

.....  
 .....

(2)

(Total 13 marks)

**Q2.**A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

- (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

.....

.....

.....

.....

.....

.....

.....

.....

.....

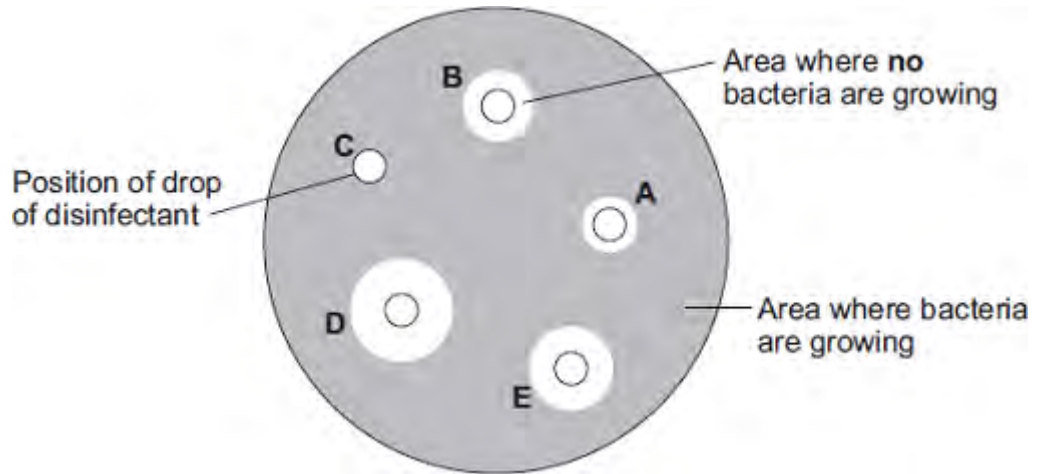
.....

.....

**(6)**

- (b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.



- (i) There are areas on the agar jelly where **no** bacteria are growing.  
Why?

.....  
.....

(1)

- (ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

.....  
.....  
.....

Give **one** reason why the student might **not** be correct.

.....  
.....  
.....

(2)

(Total 9 marks)

**Q3.**The MMR vaccine is used to protect against measles.

- (a) Apart from measles, which **two** other diseases does the MMR vaccine protect against?

..... and .....

(1)

- (b) Read the information.

Measles is a dangerous disease caused by a virus.  
Normally, MMR vaccinations are given at 1 year old and again at 4 years old.  
Each vaccination is 90% effective in protecting against the measles virus.

In April 2013, there were 630 cases of measles in children aged 4 and over in a small area of the UK. Of these cases, 504 children had not been vaccinated against MMR at all and only a few had been given a second vaccination.

- (i) Calculate the percentage of the children who caught measles in April 2013 who had **not** been vaccinated against MMR.

.....  
.....  
.....

Percentage = .....

(2)

- (ii) Suggest **one** advantage to the population as a whole of children having the second MMR vaccination.

.....

(1)

- (c) (i) What does a vaccine contain?

.....  
.....

(1)

(ii) Explain how a vaccination prevents infection.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

(3)

(d) (i) Antibiotics can only be used to treat some infections.

Explain why antibiotics **cannot** be used to treat measles.

.....  
.....  
.....  
.....

(2)

(ii) Why do antibiotics become less useful at treating an infection if the antibiotic is overused?

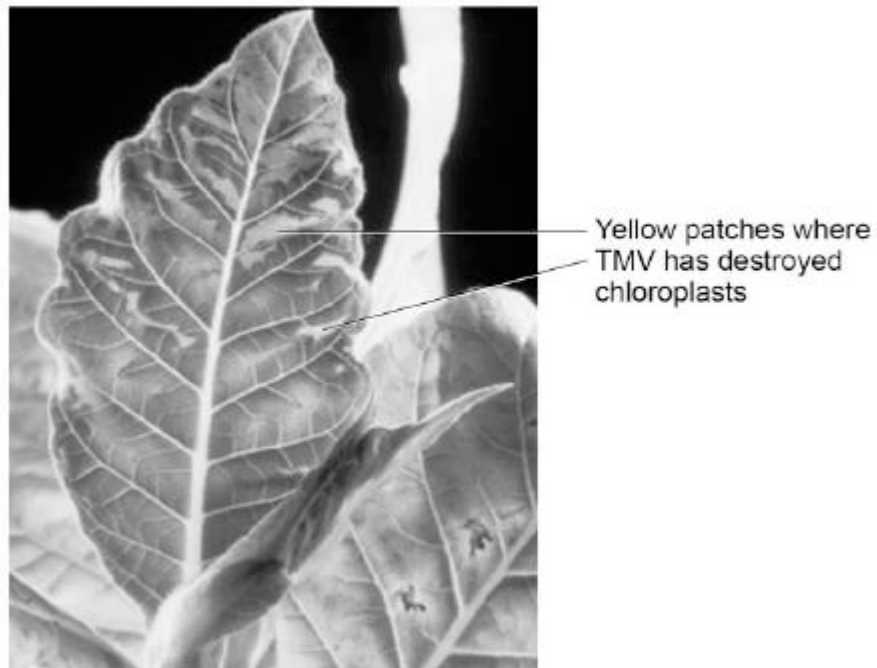
.....  
.....

(1)

(Total 11 marks)

**Q4.** Tobacco mosaic virus (TMV) is a disease affecting plants.

The diagram below shows a leaf infected with TMV.



© Nigel Cattlin/Visuals Unlimited/Getty Images

- (a) All tools should be washed in disinfectant after using them on plants infected with TMV.

Suggest why.

.....  
.....

(1)

- (b) Scientists produced a single plant that contained a TMV-resistant gene.

Suggest how scientists can use this plant to produce **many** plants with the TMV-resistant gene.

.....  
.....

(1)

- (c) Some plants produce fruits which contain glucose.



Describe how you would test for the presence of glucose in fruit.

.....  
.....  
.....  
.....

(2)

(d) TMV can cause plants to produce less chlorophyll.

This causes leaf discoloration.

Explain why plants with TMV have stunted growth.

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

(4)

(Total 8 marks)

**Q5.**Microorganisms cause infections.

The human body has many ways of defending itself against microorganisms.

(a) Describe **two** ways the body prevents the entry of microorganisms.

1 .....

.....

2 .....

.....

**(2)**

(b) In 2014 the Ebola virus killed almost 8000 people in Africa.

Drug companies have developed a new drug to treat Ebola.

Explain what testing must be done before this new drug can be used to treat people.

.....

.....

.....

.....

.....

.....

.....

.....

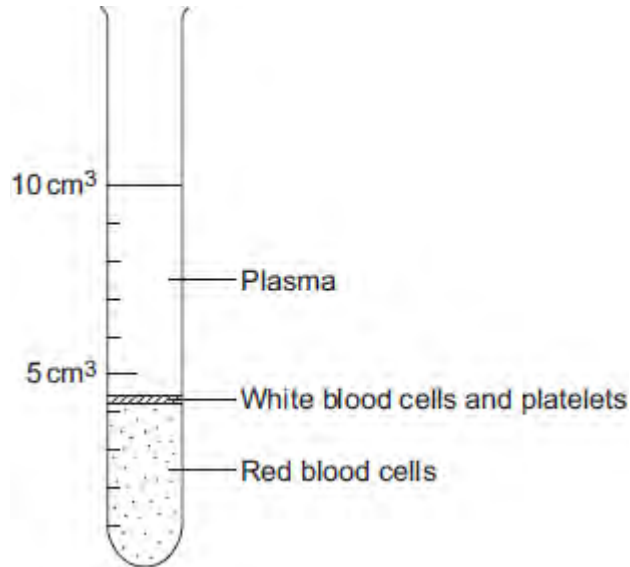
.....

.....

**(6)**  
**(Total 8 marks)**

**Q6.** The parts of the blood can be separated from each other by spinning the blood in a centrifuge.

The image below shows the separated parts of a 10 cm<sup>3</sup> blood sample.



(a) Calculate the percentage of the blood that is made up of plasma.

.....  
 .....

Answer = ..... %

(2)

(b) Name **three** chemical substances transported by the plasma.

1.....  
 2.....  
 3.....

(3)

(c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

White blood cells are part of the immune system. White blood cells help the body to defend itself against pathogens.

Describe how pathogens cause infections **and** describe how the immune system

defends the body against these pathogens.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6)  
(Total 11 marks)

- M1.** (a) stomach and pancreas correctly labelled 1
- (b) bacteria not killed (by stomach acid / HCl) and so they damage mucus lining 1
- so acid / HCl damages stomach tissue / causes an ulcer  
*allow bacteria infect stomach tissue* 1
- (c) if the cancer is malignant 1
- (cancer) cells can spread to other organs 1
- via the blood forming a secondary tumour  
*do not award marking points 2 or 3 without marking point 1* 1
- (d) add Biuret reagent to food sample  
*allow sodium / potassium hydroxide (solution) + copper sulfate(solution)* 1
- mauve / purple colour shows protein present 1
- (e) damaged villi reduce surface area for absorption (of food molecules) 1

(therefore) fewer amino acids and glucose absorbed

1

with less glucose transfer of energy from respiration is reduced

1

and fewer amino acids available to build new proteins

1

[12]

**M2. (a) (i) any one from:**

- cells
- tissues
- (live) animals / named  
*allow mammals*

1

**(ii) any three from:**

(to test for)

- toxicity / check not poisonous / not harmful  
*allow side-effect*  
*allow converse*
- interaction with other drugs
- efficacy **or** to see if they work **or** check if they treat the disease  
*allow converse*
- dosage **or** how much is needed

3

**(b) argued evaluation**

*comparison can be written anywhere in evaluation allow use of 'only' for implied comparison for each point eg **only** statins damage muscles / kidneys / organs*

any **six** from:

- statin can damage / muscles / kidneys / organs but cholesterol blockers don't  
*ignore liver*  
*if neither of the first 2 points are given accept for 1 mark*
- statins can cause death but cholesterol blockers don't  
*statins are more dangerous than cholesterol blockers **or** statins have more side effects*
- cholesterol blockers can interfere with action of other drugs but statins don't
- statins are for a life time but cholesterol blockers are not

- statins (might) reduce cholesterol to zero but cholesterol blockers only reduce it **or** statins reduce cholesterol more  
*allow statins (might) stop membrane / hormone production  
but cholesterol blockers don't*
- statins better for people with inherited high cholesterol
- cholesterol blockers better for people with dietary cholesterol problems
- taking/using statins/cholesterol blockers is better than dying from heart attack or build up of fat in blood vessels or reduced blood flow

6

[10]



- M3.** (a) dead or inactive or weak form of pathogen / bacterium / virus / microorganism introduced  
*ignore disease / germ* 1
- (stimulates) white cells / lymphocytes / leucocytes  
*accept B and T cells*  
*ignore phagocytes* 1
- to produce antibodies  
*ignore antitoxins / antigens* 1
- antibodies made quickly on re-infection / idea of memory cells  
*ignore already has antibodies*  
*ignore 'body remembers'* 1
- (b) (i) alters / causes chemical processes / body chemistry  
*ignore craving / withdrawal symptoms* 1
- (ii) any **two** from:
- combined molecule / vaccine stimulates antibody production
  - if nicotine taken, antibodies bind to nicotine molecules  
*ignore destroys nicotine*
  - making them too large to get to brain / making them ineffective  
*allow prevents nicotine entering brain* 2

[7]

- M4.** (a) (i) kills / gets rid of / reduces methane bacteria  
*allow kills / gets rid of / reduces bad bacteria*  
*ignore acts like antibiotic* 1
- (ii) less food converted to methane  
*allow can keep more cattle without further environmental damage*  
*ignore energy* 1
- more growth / meat / muscle / milk produced / more profit / fatter animals  
*ignore references to bacteria and disease* 1
- (b) absorbs energy / heat radiated by Earth  
*allow absorbs / traps energy / heat / from Earth*  
*do **not** allow absorbs energy / heat from Sun* 1
- some energy / heat reradiated  
*ignore reflected*  
*do **not** allow reradiates energy / heat from Sun* 1
- leading to global warming / enhanced greenhouse effect  
*accept effects of global warming eg melting ice caps*  
*accept methane is a greenhouse gas*  
*ignore references to ozone* 1

[6]

**M5.** (a) (i) viruses live inside cells 1

viruses inaccessible to antibiotic  
*allow drug / antibiotic (if used)*  
*would (have to) kill cell* 1

(ii) any **two** from eg 2

- non-resistant strains killed (by antibiotics)
- so less competition
- overuse of antibiotics / antibiotics prescribed for mild infections  
*if no marks gained allow one mark for 'people do not finish course of antibiotics'*

(b) (stimulate) antibody production 1  
*ignore antitoxin*

(by) white cells 1

rapidly produce antibody on re-infection 1  
*ignore antibodies remain in blood*

[7]

**M6.** (a) vector 1

(b) any **three** from:  
• destroy the snails  
• isolate infected dogs  
• treat infected dogs  
*allow vaccination*  
• educate owners about picking up dog faeces 3

(c) stop mosquitoes breeding  
*allow correct description* 1

use mosquito nets  
*allow use of insect repellent* 1

**[6]**

- M7.** (a) (i) any **one** from:
- (produce) toxins / poisons
  - (cause) damage to cells  
*kill / destroy cells*  
*allow kills white blood cells*
- 1
- (ii) produce antitoxins
- 1
- engulf / ingest / digest pathogens / viruses / bacteria / microorganisms  
*accept phagocytosis or description*  
*ignore eat / consume / absorb for engulf*  
*ignore references to memory cells*
- 1
- (b) (i) dead / inactive / weakened  
*accept idea of antigen / protein*
- 1
- (measles) pathogen / virus  
*ignore bacteria*
- 1
- (ii) (after infection)  
*accept converse if clearly referring to before vaccination*
- 1
- rise begins sooner / less lag time  
steeper / faster rise (in number)
- 1

longer lasting **or** doesn't drop so quickly  
*idea of staying high for longer*  
*ignore reference to higher starting point*

1

(iii) antibodies are specific or needs different antibodies  
*accept antigens are different **or** white blood cells do not*  
*recognise virus*

1

(c) reduces spread of infection / less likely to get an epidemic  
*accept idea of eradicating measles*

1

**[10]**