PEARSON EDEXCEL GCSE BIOLOGY (HIGHER) · 1BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 5: HEALTH, DISEASE AND THE DEVELOPMENT OF MEDICINES (PACK 4)

SCORE	PERCENTAGE
/94	%

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Q1.

Clostridium tetani is a bacterium that can be found in soil.

It causes the infection tetanus.

Children are vaccinated against tetanus.

Explain why these children do not get tetanus if the bacteria enter their body through a cut in the skin.

(3)

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(Total for question = 3 marks)

Q2.

Cancer Research UK found that many people do not realise that obesity is linked to an increased risk of developing cancer.

In the body, fat tissue sends signals that cause other cells to divide.

Two men have the same mass of 80 kg.

One man's BMI is categorised as normal weight, the other man's BMI is categorised as obese.

Explain why the men have different BMI values.

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(Total for question = 2 marks)

Q3.

Two men have the same mass of 80 kg.

One man's BMI is categorised as normal weight, the other man's BMI is categorised as obese.

Explain why the men have different BMI values.

(2)

.....

.....

.....

(Total for question = 2 marks)

Q4.

Clostridium tetani is a bacterium that can be found in soil.

It causes the infection tetanus.

Children are vaccinated against tetanus.

Explain why these children do not get tetanus if the bacteria enter their body through a cut in the skin.

(3)

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(Total for question = 3 marks)

Q5.

Haemochromatosis is a disease that occurs when iron accumulates in the liver.

A person with haemochromatosis is treated by having 0.5 dm^3 of their blood removed each week.

This lowers the level of iron in their blood.

(i) Give **two** safety precautions needed when blood is removed from this person.

(2)

1 .....

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2 .....

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(ii) Haemochromatosis can be inherited.

Haemochromatosis occurs when a person inherits two copies of a recessive allele.

Figure 9 shows the inheritance of haemochromatosis in a family.

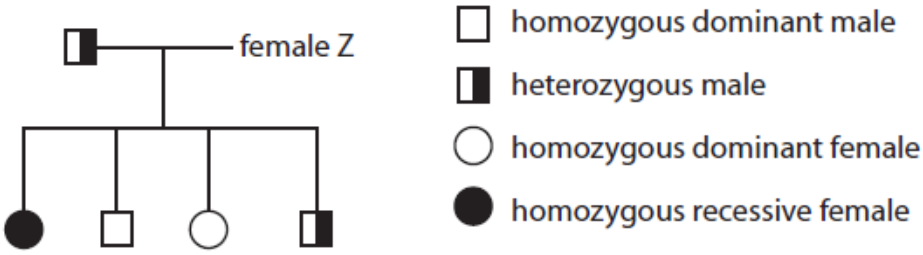


Figure 9

State and explain the genotype of female Z.

(3)

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(Total for question = 5 marks)

Q6.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Streptococcus mutans is one species of bacteria which causes tooth decay.

A scientist tested the effectiveness of toothpaste at killing this species of bacteria.

The scientist spread the bacteria *Streptococcus mutans* across an agar jelly plate.

(i) Which word describes the techniques used to prevent contamination of the agar jelly plate?

(1)

☒ **A** clinical

☒ **B** diagnostic

☒ **C** aseptic

☒ **D** lysogenic

(ii) Give **two** precautions needed to prevent contamination of the agar jelly plate.

(2)

1 .....

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2 .....

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(Total for question = 3 marks)

Q7.

In 2014, nearly 155 000 people died from cardiovascular disease in the UK.

Figure 2 shows the use of a stent to treat cardiovascular disease.

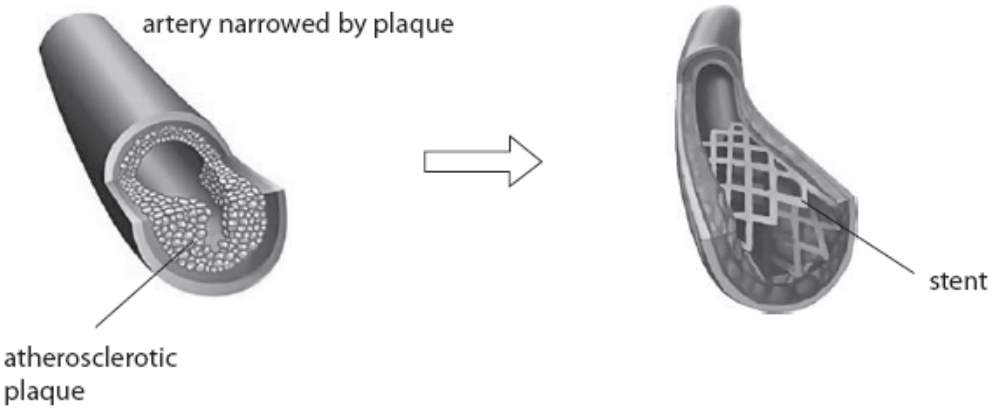


Figure 2

Explain how a stent works to treat cardiovascular disease.

(3)

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(Total for question = 3 marks)

Q8.

Name the organisation which defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

(1)

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(Total for question = 1 mark)

Q9.

In 2014, nearly 155 000 people died from cardiovascular disease in the UK.

Figure 1 shows information about the BMI and the lifestyle of two males, P and Q, who have the same height and age.

male	BMI	physical exercise in hours per week	percentage of total daily intake of nutrients (%)		
			carbohydrate	protein	fat
P	24	7	50	20	30
Q	29	2	50	15	35

Figure 1

(i) Which measurements are used to calculate BMI?

(1)

☒ **A** waist and hip

☒ **B** hip and mass

☒ **C** height and mass

☒ **D** waist and height

(ii) Explain which male has a greater risk of developing cardiovascular disease.

(3)

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(Total for question = 4 marks)

Q10.

In 2014, nearly 155 000 people died from cardiovascular disease in the UK.

Drugs have been developed to treat people with cardiovascular disease.

Developing drugs involves many stages.
One stage involves testing the drugs on other mammals before testing them on humans.

Give **one** disadvantage of using other mammals for drug testing.

(1)

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(Total for question = 1 mark)

Q11.

Streptococcus bacteria can cause a sore throat or skin infection.

An illness called scarlet fever can also develop during an infection with this bacterium.

(i) Give **two** precautions a doctor should take when treating a patient who is infected with *Streptococcus*.

(2)

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(ii) From September 2013 to March 2014 there were 2 830 cases of scarlet fever in the UK.

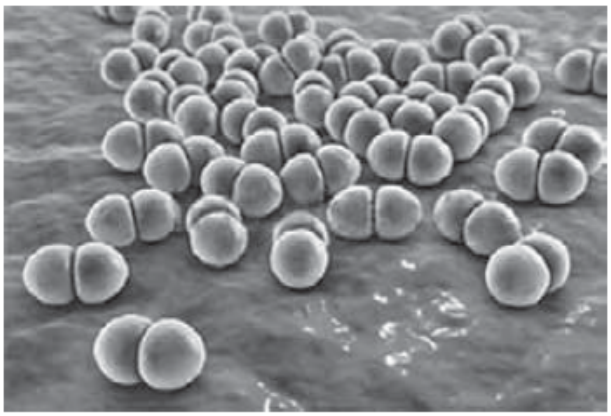
From September 2014 to March 2015 there were 5 943 cases of scarlet fever.

Calculate the percentage increase of the number of cases of scarlet fever between the periods September 2014 to March 2015 and September 2013 to March 2014.

(2)

..... %

(iii) Figure 10 shows some *Streptococcus* bacteria.



© Kateryna Kon/Shutterstock

Figure 10

Some bacteria are motile, meaning they can move themselves.

Why is a *Streptococcus* bacterium not motile?

(1)

☒ **A** it does not have flagella

☒ **B** it does not have plasmids

☒ **C** it does not have ribosomes

☒ **D** it does not have acrosomes

(Total for question = 5 marks)

Q12.

Streptococcus bacteria can cause a sore throat or skin infection.

An illness called scarlet fever can also develop during an infection with this bacterium.

(i) Give **two** precautions a doctor should take when treating a patient who is infected with *Streptococcus*.

(2)

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(ii) From September 2013 to March 2014 there were 2 830 cases of scarlet fever in the UK.

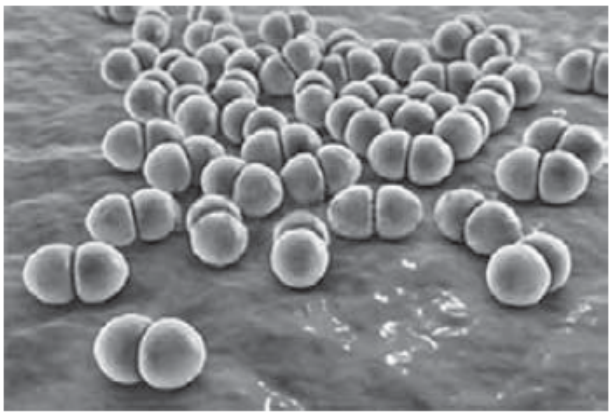
From September 2014 to March 2015 there were 5 943 cases of scarlet fever.

Calculate the percentage increase of the number of cases of scarlet fever between the periods September 2014 to March 2015 and September 2013 to March 2014.

(2)

..... %

(iii) Figure 10 shows some *Streptococcus* bacteria.



© Kateryna Kon/Shutterstock

Figure 10

Some bacteria are motile, meaning they can move themselves.

Why is a *Streptococcus* bacterium not motile?

(1)

☒ **A** it does not have flagella

☒ **B** it does not have plasmids

☒ **C** it does not have ribosomes

☒ **D** it does not have acrosomes

(Total for question = 5 marks)

Q13.

Patients with scarlet fever can be treated with antibiotics.

New antibiotics need to be tested before they can be used in patients.

Which is the correct sequence for the development of a new medicine?

(1)

- ☒ **A** testing in healthy volunteers → testing using cultured cells → double blind trials on patients
- ☒ **B** testing using cultured cells → double blind trials on patients → testing in healthy volunteers
- ☒ **C** testing in healthy volunteers → double blind trials on patients → testing using cultured cells
- ☒ **D** testing using cultured cells → testing in healthy volunteers → double blind trials on patients

(Total for question = 1 mark)

Q14.

Patients with scarlet fever can be treated with antibiotics.

New antibiotics need to be tested before they can be used in patients.

Which is the correct sequence for the development of a new medicine?

(1)

- ☒ **A** testing in healthy volunteers → testing using cultured cells → double blind trials on patients
- ☒ **B** testing using cultured cells → double blind trials on patients → testing in healthy volunteers
- ☒ **C** testing in healthy volunteers → double blind trials on patients → testing using cultured cells
- ☒ **D** testing using cultured cells → testing in healthy volunteers → double blind trials on patients

(Total for question = 1 mark)

Q15.

Which data can be used to calculate BMI?

(1)

- ☒ **A** waist circumference and height

☒ **B** waist circumference and hip circumference

☒ **C** mass and height

☒ **D** mass and hip circumference

(Total for question = 1 mark)

Q16.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Which data can be used to calculate the man's BMI?

(1)

☒ **A** waist circumference and height

☒ **B** waist circumference and hip circumference

☒ **C** mass and height

☒ **D** mass and hip circumference

(Total for question = 1 mark)

Q17.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The human immunodeficiency virus (HIV) can cause AIDS.

Which type of cell is destroyed by the HIV virus?

☒ **A** red blood cell

☒ **B** nerve cell

☒ **C** white blood cell

☒ **D** sperm cell

(Total for question = 1 mark)

Q18.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The human immunodeficiency virus (HIV) can cause AIDS.

Which type of cell is destroyed by the HIV virus?

(1)

☒ **A** red blood cell

☒ **B** nerve cell

☒ **C** white blood cell

☒ **D** sperm cell

(Total for question = 1 mark)

Q19.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Between 2013 and 2016 there was an outbreak of a disease called Ebola.

Ebola is estimated to have caused the deaths of more than 11 000 people.

(i) Why is the number of deaths from Ebola only an estimate?

(1)

☒ **A** many people were immune to Ebola

☒ **B** many deaths were not confirmed to be caused by Ebola

☒ **C** Ebola does not spread easily

☒ **D** Ebola does not cause any symptoms

(ii) State how Ebola is spread from person to person.

(1)

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(iii) The lytic pathway is part of the lifecycle of the Ebola virus.

After infection of the host cell, components of the virus are produced.

Describe the next stages of the lytic pathway.

(2)

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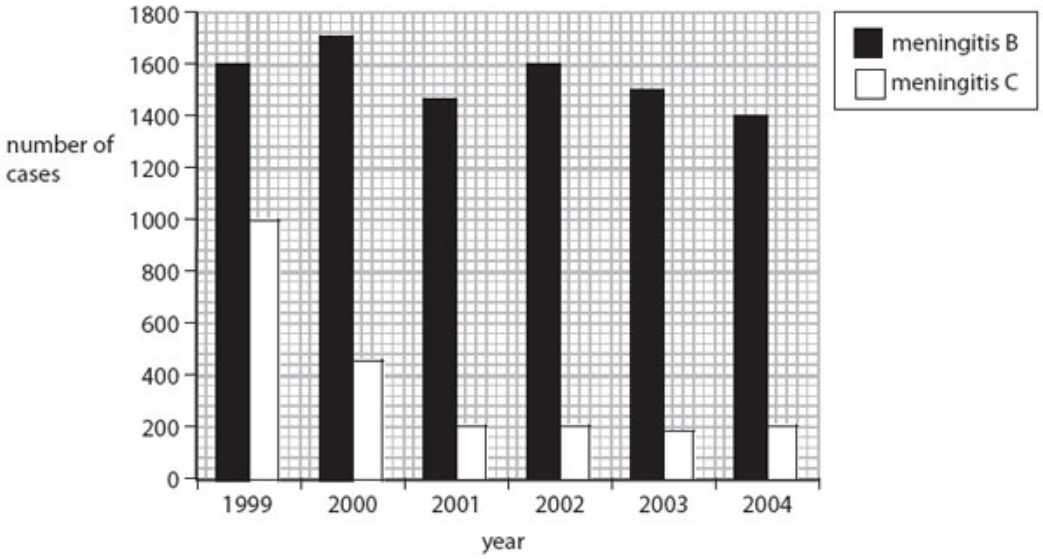
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(Total for question = 4 marks)

Q20.

Meningitis B and meningitis C are caused by bacteria.

The graph shows the number of cases of meningitis B and meningitis C in England, from 1999 to 2004.



(a) (i) Use the graph to calculate the change in the total number of cases of meningitis in 1999 compared with 2004.

(2)

answer = ...

(ii) Immunisation against meningitis C was introduced in 1999.

Describe the effects the immunisation had on the number of cases of both types of meningitis.

(2)

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(b) Complete the sentence by putting a cross (☒) in the box next to your answer.

The molecules on pathogens which cause an immune response are called

(1)

☒ **A** antigens

☒ **B** bacteria

☒ **C** hybridomas

☒ **D** lymphocytes

(c) (i) Monoclonal antibodies can be produced in large quantities.

Describe the steps in producing monoclonal antibodies.

(3)

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(ii) Explain the advantage of using monoclonal antibodies to treat cancer.

(2)

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(Total for Question = 10 marks)

Q21.

Describe the response of the human body to immunisation.

(3)

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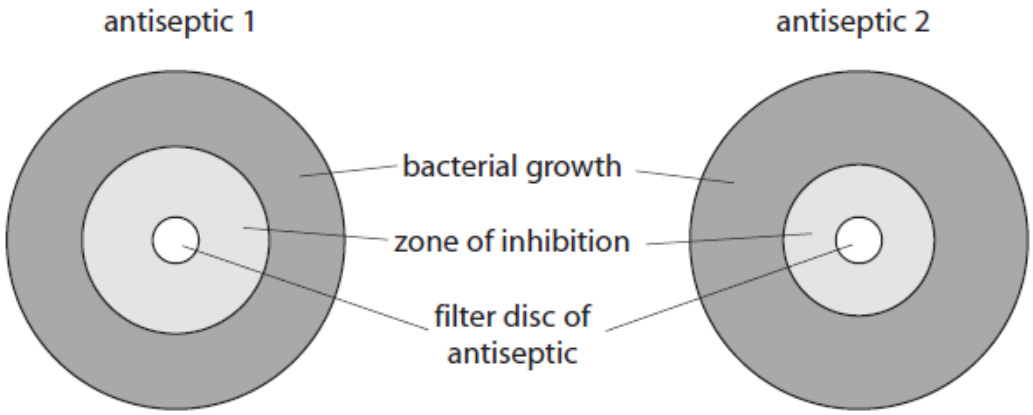
Q22.

Streptococcus pyogenes is a bacterium that causes communicable infections.

Scientists tested the ability of two antiseptics to kill *Streptococcus pyogenes* bacteria.

They spread *Streptococcus pyogenes* bacteria on two agar jelly plates and placed a small disc of filter paper containing antiseptic in the centre of each dish.

Figure 3 shows the results of the test after 24 hours of incubation.



antiseptic 1 zone of inhibition	
radius (mm)	12
area (mm^2)	452

Figure 3

(i) Calculate the area of the zone of inhibition for antiseptic 2.

Give the answer to 3 significant figures.

($\pi = 3.14$)

(3)

zone of inhibition for antiseptic 2 = ... mm^2

(ii) Explain which antiseptic is the most effective.

(2)

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(iii) After the bacteria were spread on the plates, both plates were incubated for 24 hours at 37°C.

Give a reason why the plates were incubated at 37°C.

(1)

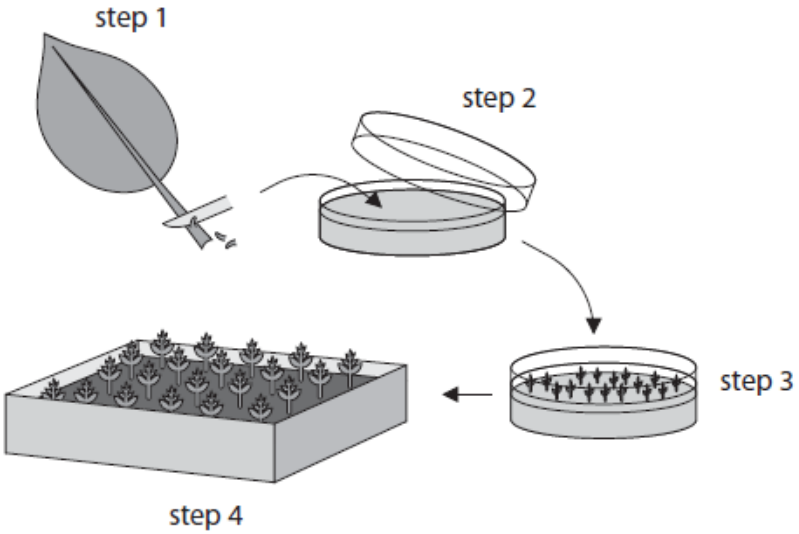
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(Total for question = 6 marks)

Q23.

Figure 8 shows a method of producing plants.



Step 1. Cells taken from parent plant.

Step 2. Cells placed on agar growth medium.

Step 3. Cells develop into tiny plantlets.

Step 4. Plantlets grown in compost.

Figure 8

(i) Some cells in each plantlet develop into root cells.

Name the process occurring as these cells develop into root cells.

(1)

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(ii) Describe the advantages of producing plants by the method shown in Figure 8.

(2)

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(iii) An autoclave is used to prepare the agar growth medium used in Step 2.

Explain why the agar growth medium is autoclaved.

(2)

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(iv) One of the plantlets had different coloured leaves.

Give **one** reason why this plantlet had different coloured leaves.

(1)

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(Total for question = 6 marks)

Q24.

A scientist was planning to compare the effectiveness of the antibiotic myxopyronin on two different species of bacteria.

Figure 18 shows the equipment the scientist can use.

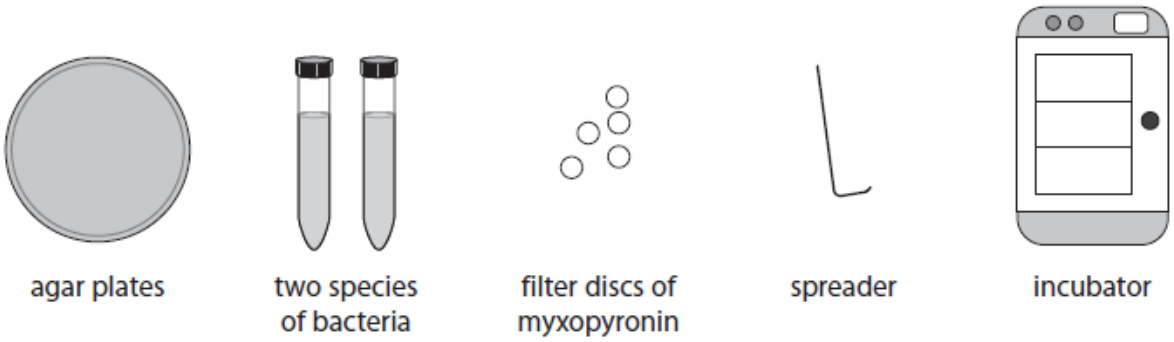


Figure 18

(i) Describe how the scientist could determine the effectiveness of myxopyronin on the two species of bacteria.

(2)

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(ii) Myxopyronin inhibits bacterial RNA polymerase.

Explain why the antibiotic myxopyronin can be used to treat bacterial infections in humans.

(4)

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(Total for question = 6 marks)

Q25.

In 2017, a new strain of *Klebsiella pneumoniae* bacteria was discovered that was resistant to 26 different antibiotics.

(i) Explain how *Klebsiella pneumoniae* bacteria developed resistance to antibiotics.

(4)

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(ii) State how the use of antibiotics could contribute to *Klebsiella pneumoniae* bacteria developing resistance to antibiotics.

(1)

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(iii) *Klebsiella pneumoniae* is a prokaryotic cell.

Which is a characteristic feature of a prokaryotic cell?

(1)

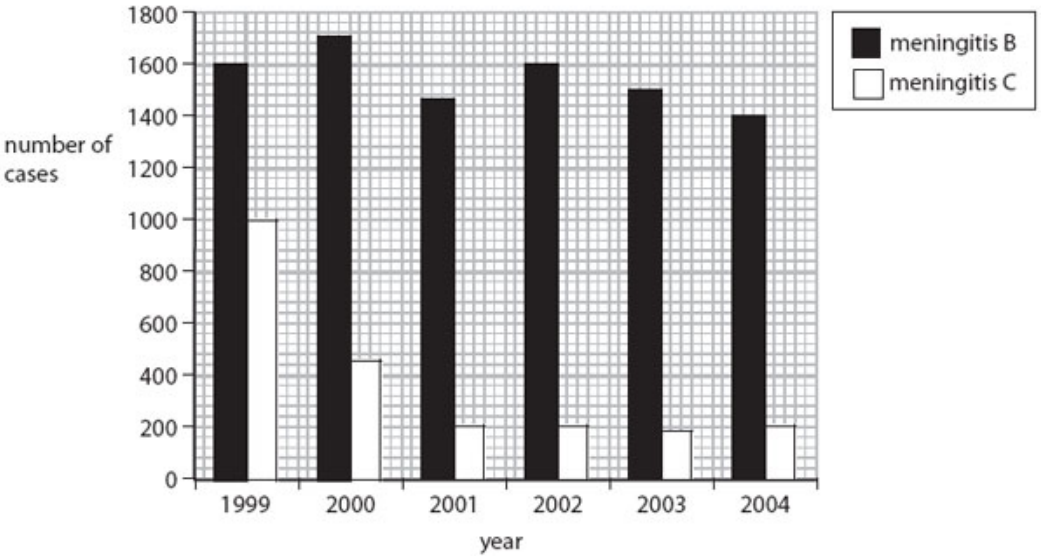
- ☒ **A** it has chloroplasts
- ☒ **B** it does not have a nucleus
- ☒ **C** it does not have ribosomes
- ☒ **D** it cannot reproduce without a host

(Total for question = 6 marks)

Q26.

Meningitis B and meningitis C are caused by bacteria.

The graph shows the number of cases of meningitis B and meningitis C in England, from 1999 to 2004.



(i) Use the graph to calculate the change in the total number of cases of meningitis in 1999 compared with 2004.

(2)

answer = ...

(ii) Immunisation against meningitis C was introduced in 1999.

Describe the effects the immunisation had on the number of cases of both types of meningitis.

(2)

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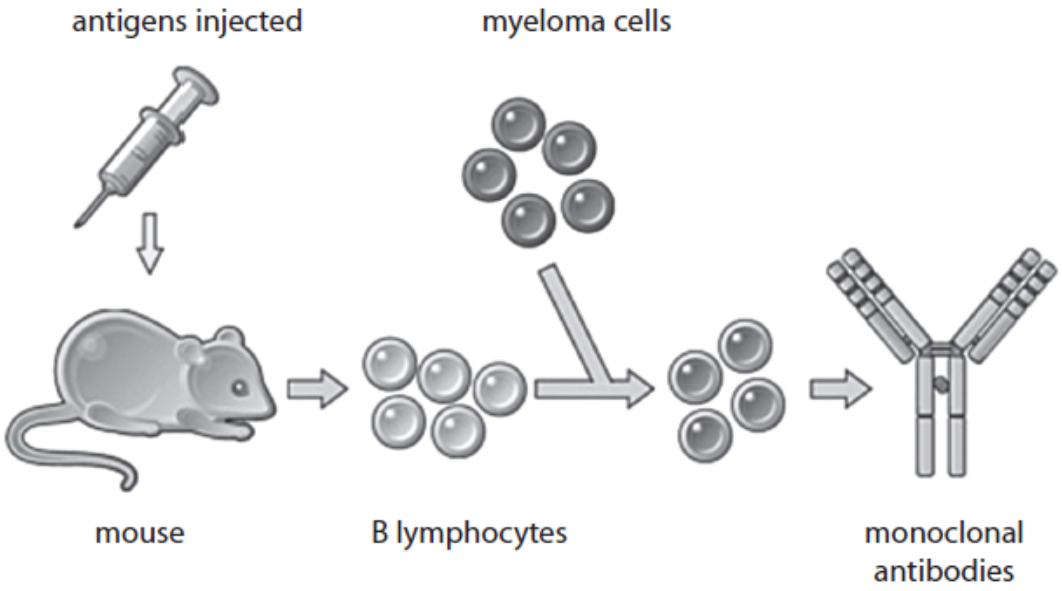
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Q27.

Monoclonal antibodies and the immune response

The diagram shows some stages in the production of monoclonal antibodies.



(a) (i) Complete the sentence using words from the box.

(2)

memory lymphocytes	exponential	hybridomas
immune	aseptic	myeloma cells

Injecting antigens into the mouse produces an .....

response resulting in the production of antibodies and ..... .

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The cells produced when B lymphocytes and myeloma cells combine are

(1)

☒ **A** antibodies

☒ **B** hybridomas

☒ **C** memory lymphocytes

☒ **D** platelets

(iii) Describe **two** ways in which monoclonal antibodies are used in medical diagnosis.

(2)

1

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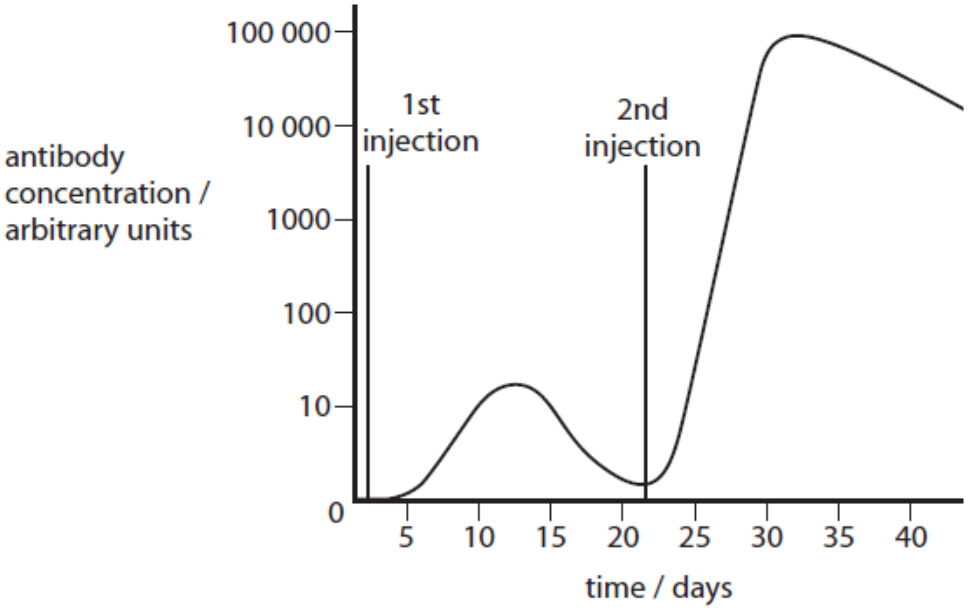
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(b) The graph shows the antibody concentration in a mouse after the first and second injection of the same antigens.



(i) Compare the antibody response after the first injection with the antibody response after the second injection.

(2)

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(ii) Suggest how this secondary response to antigens benefits the mouse.

(1)

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(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Injecting patients with antigens forms the basis of vaccination.

This was first developed by

(1)

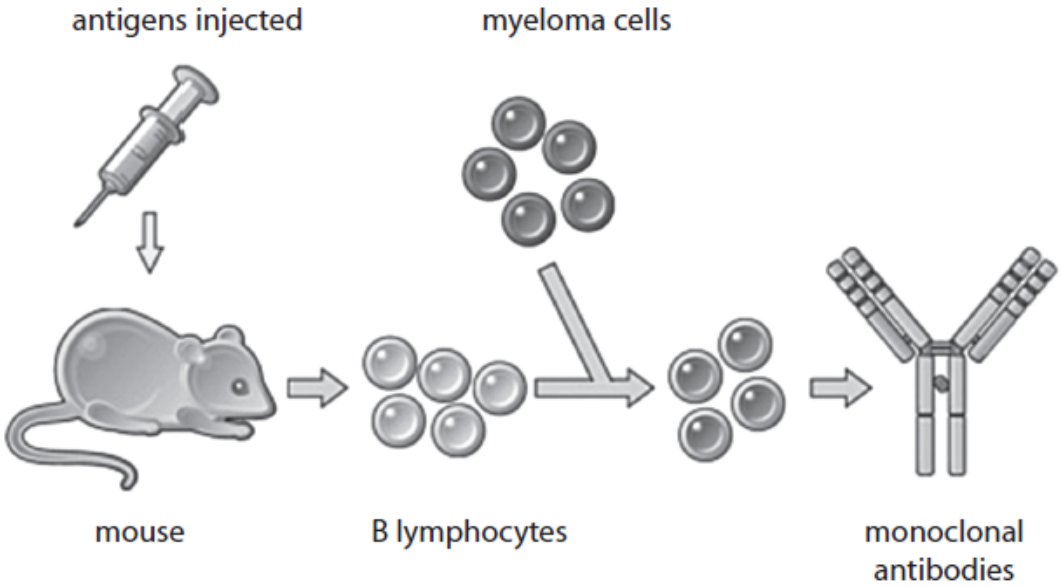
- ☒ **A** Diane Fossey
- ☒ **B** Edward Jenner
- ☒ **C** Louis Pasteur
- ☒ **D** Mary Leakey

(Total for question = 9 marks)

Q28.

Monoclonal antibodies and the immune response

The diagram shows some stages in the production of monoclonal antibodies.



(a) (i) Complete the sentence using words from the box.

(2)

memory lymphocytes	exponential	hybridomas
immune	aseptic	myeloma cells

Injecting antigens into the mouse produces an .....

response resulting in the production of antibodies and ..... .

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The cells produced when B lymphocytes and myeloma cells combine are

(1)

☒ **A** antibodies

☒ **B** hybridomas

☒ **C** memory lymphocytes

☒ **D** platelets

(iii) Describe **two** ways in which monoclonal antibodies are used in medical diagnosis.

(2)

1

.....

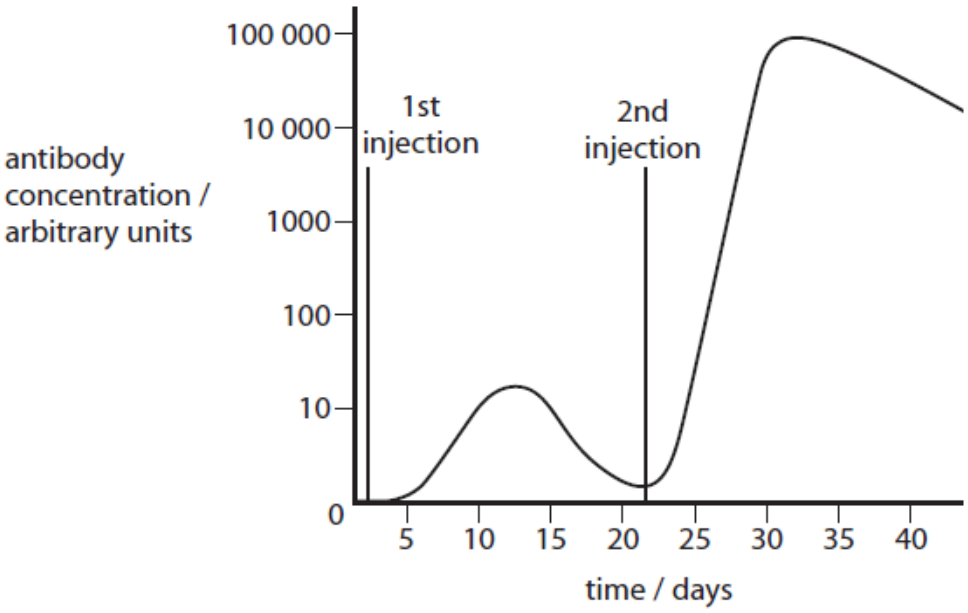
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(b) The graph shows the antibody concentration in a mouse after the first and second injection of the same antigens.



(i) Compare the antibody response after the first injection with the antibody response after the second injection.

(2)

.....

.....

.....

.....

.....

.....

(ii) Suggest how this secondary response to antigens benefits the mouse.

(1)

.....

.....

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Injecting patients with antigens forms the basis of vaccination.

This was first developed by

(1)

☒ **A** Diane Fossey

☒ **B** Edward Jenner

☒ **C** Louis Pasteur

☒ **D** Mary Leakey

(Total for question = 9 marks)

Q29.

Monoclonal antibody technology is used in pregnancy tests and in the treatment of cancer.

(i) Explain how monoclonal antibodies are used to test for pregnancy.

(3)

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(ii) The use of monoclonal antibodies to treat cancer has advantages over the use of traditional chemotherapy and radiotherapy.

Explain the benefits of using monoclonal antibodies to treat cancer.

(2)

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(iii) Name the type of cell that produces the monoclonal antibodies used to treat cancer.

(1)

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Q30.

Haemochromatosis is a disease that occurs when iron accumulates in the liver.

A person with haemochromatosis is treated by having 0.5 dm^3 of their blood removed each week.

This lowers the level of iron in their blood.

(i) Give **two** safety precautions needed when blood is removed from this person.

(2)

1 .....

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2 .....

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(ii) Haemochromatosis can be inherited.

Haemochromatosis occurs when a person inherits two copies of a recessive allele.

Figure 6 shows the inheritance of haemochromatosis in a family.

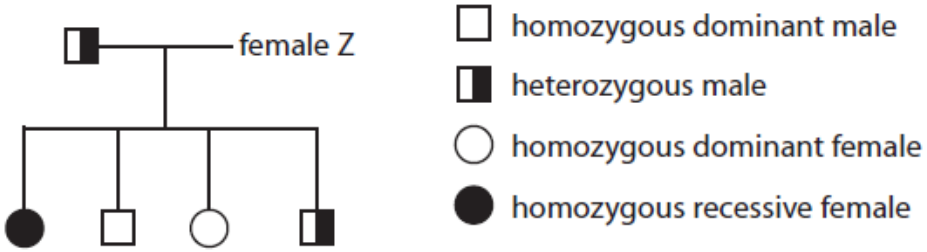


Figure 6

State and explain the genotype of female Z.

(3)

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(Total for question = 5 marks)