

1(a). Diseases in plants are caused by different types of pathogens.

Which type of pathogen causes each of these diseases?

Use words from the list.

Bacteria	Fungi	Protists	Virus
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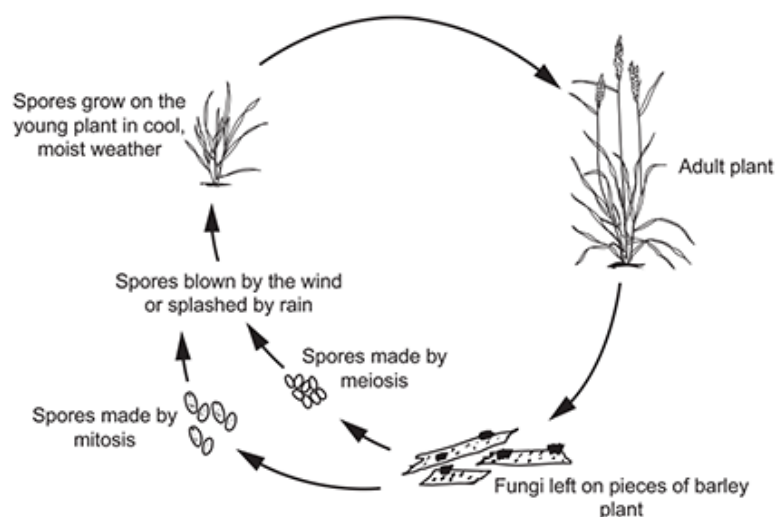
Tobacco mosaic disease:

Crown gall disease:

[2]

(b). Barley plants are infected by a fungus that causes powdery mildew.

The diagram shows the life cycle of the fungus.



i. Rainy weather in the spring causes **more** barley plants to be infected with powdery mildew.

Suggest **two** reasons why. Use the diagram.

1 _____

2 _____

[2]

ii. The fungus reproduces using spores.

Which type of reproduction uses meiosis to make spores?

[1]

- iii. Farmers make sure that they clear all the dead barley plants from their fields in the autumn.

Explain why.

[2]

2. Spinal muscular atrophy (SMA) is a genetic disease.

700 000 babies are born each year in the UK.

35 of these babies are born with SMA.

Calculate the percentage of babies that have SMA.

Percentage of babies with SMA = % [2]

3. Using stem cells to treat disease is a new technique in medicine.

What is an **ethical** issue with this process?

- A Embryos may be destroyed in the process.
- B It is very expensive.
- C It needs highly trained doctors.
- D Some patients may need repeat treatments.

Your answer

☐

[1]

4. Spinal muscular atrophy (SMA) is a genetic disease.

Researchers have developed a treatment for SMA.

This involves using a virus to insert a replacement gene into the nucleus of motor neurone cells.

- i. Why is the gene inserted into the **nucleus** of the motor neurone?

[1]

- ii. Researchers tested this treatment on animals first.

Suggest **one** reason why they did this.

[1]

5. What is the link between HIV and tuberculosis?

- A Both HIV and tuberculosis increase the risk of cervical cancer.
- B HIV infection increases the risk of getting tuberculosis.
- C HIV is the virus that causes tuberculosis.
- D Patients with tuberculosis are more likely to be infected with HIV.

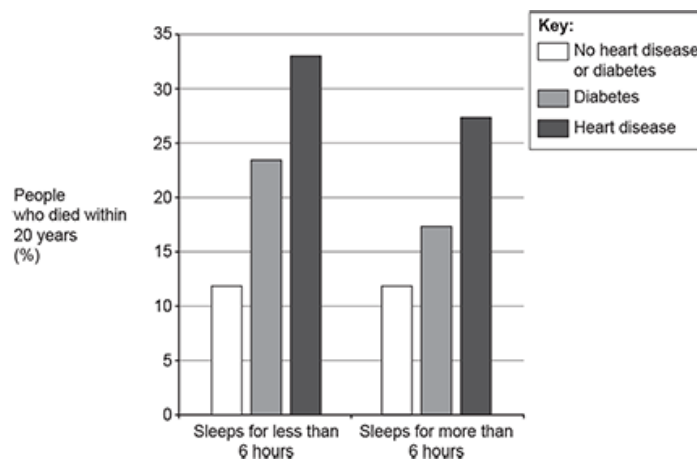
Your answer

[1]

6. Scientists studied groups of people that have diabetes, heart disease or neither condition.

They measured whether these people slept for less or more than 6 hours each night.

The graph shows the percentage in each group that died within 20 years of the study.



What is a conclusion from this graph?

- A Diabetes leads to more deaths than heart disease.
- B Sleep prevents a person getting heart disease.
- C Sleeping more than six hours decreases the risk of death from diabetes and heart disease.
- D The number of hours a person sleeps has no effect on how long they live.

Your answer

[1]

7(a). Different cells in the human body are important in defence against disease.

Draw lines to join each **type of cell** to its correct **function**.

Type of cell	Function
Cells in the stomach lining	produce antibodies to kill pathogens
Cells lining the airways	clot the blood to prevent entry of pathogens
Platelets	release mucus to trap pathogens
White blood cells	release acid to kill pathogens

[3]

(b). Vaccinations are used to protect us from diseases.

Complete this sentence about vaccinations.

Vaccinations help the body protect itself because they contain
or forms of a pathogen.

[2]

8. Which of these is a **communicable** disease?

- A Cirrhosis of the liver
- B Coronary heart disease
- C Diabetes
- D Tuberculosis

Your answer ☐

[1]

9. Hepatitis is the name given to diseases that cause the liver to be inflamed.

The table gives information about four types of hepatitis.

	Hepatitis A	Hepatitis B	Hepatitis D	Alcoholic Hepatitis
Cause	Virus	Virus	Virus	Drinking alcohol
Details of cause	Virus is taken in through food and drink contaminated with faeces.	Virus is taken in through contaminated blood.	Virus is taken in through contaminated blood.	Excessive alcohol consumption over some time.
Effect on the body	Usually lasts for two months then a person cannot develop the disease again.	Usually lasts for one to three months then a person cannot develop the disease again.	Can only develop symptoms if a person has hepatitis B.	Can cause liver failure and death.

Explain why hepatitis **A cannot** be treated using antibiotics. Use information from the table.

[2]

10. When a drug is developed to treat a disease, the drug is tested.

What is the final stage in this testing?

- A** Testing on animals to see if it is safe.
- B** Testing on animals to work out the correct dose.
- C** Testing on healthy people to see if it has side effects.
- D** Testing on people with the disease to see if it is effective.

Your answer

[1]

11. Hepatitis is the name given to diseases that cause the liver to be inflamed.

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	Hepatitis A	Hepatitis B	Hepatitis D	Alcoholic Hepatitis
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Details of cause	Virus is taken in through food and drink contaminated with faeces.	Virus is taken in through contaminated blood.	Virus is taken in through contaminated blood.	Excessive alcohol consumption over some time.
Effect on the body	Usually lasts for two months then a person cannot develop the disease again.	Usually lasts for one to three months then a person cannot develop the disease again.	Can only develop symptoms if a person has hepatitis B.	Can cause liver failure and death.

For each of these questions choose your answers from the types of hepatitis shown in the table.

- i. List **all** the types of hepatitis that can be treated using antiviral tablets.

..... **[1]**

- ii. Which type of hepatitis can be prevented by regular hand washing?

..... **[1]**

- iii. Which type of hepatitis is a non-communicable disease?

..... **[1]**

- iv. Which type of hepatitis involves interaction between two different diseases?

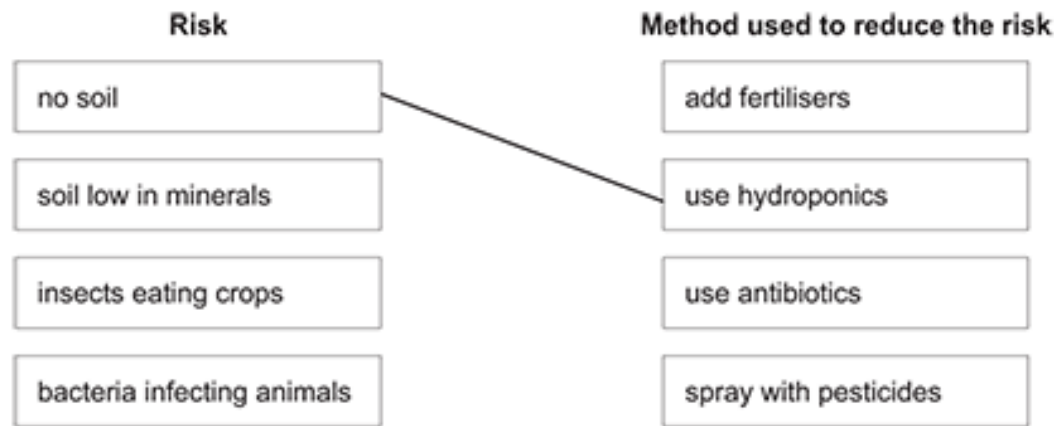
..... **[1]**

12. The demand for food in the world is growing but there are risks to the supply of food.

There are methods that can be used to reduce these risks.

Draw lines to connect each **risk** with the correct **method used to reduce the risk**.

One line has been drawn for you.



[2]

13. The cuticle on plant leaves helps to prevent pathogens entering the plant.

Which statement describes how the cuticle does this?

- A** Acts as a physical barrier
- B** Engulfs microbes
- C** Produces antimicrobial substances
- D** Releases antibodies

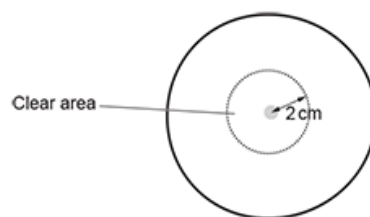
Your answer

☐

[1]

14. Antibiotics can be tested on bacteria growing on a Petri dish.

The clear area around an antibiotic disc gives information about how effective the antibiotic is.



What is the closest estimate of the clear area on this Petri dish?

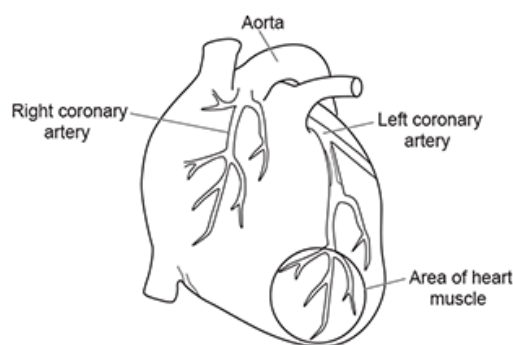
(Include the disc and use the formula: $\text{Area} = \pi r^2$ where $\pi = 3$)

- A** 3 cm^2
- B** 4 cm^2
- C** 6 cm^2
- D** 12 cm^2

Your answer

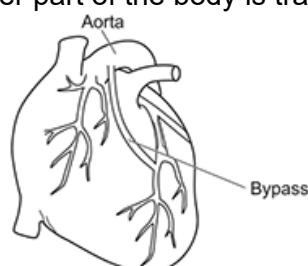
☐
[1]

15(a). The diagram shows the heart of a person who has heart disease.



This diagram shows the heart after a type of operation called a bypass.

A bypass is when a blood vessel from another part of the body is transplanted into the blood vessel of the heart.

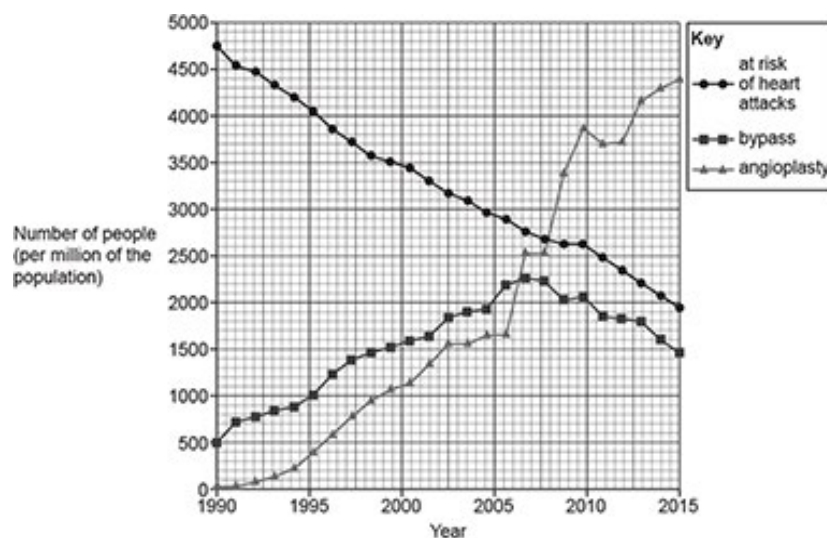


Explain how the operation would help to reduce the risk of heart disease.

[2]

(b). An angioplasty can also be used to treat heart disease.

The graph shows the number of both types of operations performed in the USA from 1990 to 2015. It also shows the number of people considered to be at high risk of a heart attack.



- i. In 1990, the population of the USA was 250 million.

Calculate the number of people that had a bypass operation in the USA in 1990.

Number of people = [2]

- ii. Use the graph to suggest **two** reasons why the number of bypass operations decreased from 2006 to 2015.

1 _____

2 _____

[2]

- (c). Heart disease causes damage as muscle cells can be replaced with scar tissue.

This makes the heart less efficient at pumping blood, which affects all the cells of the body. Doctors can treat heart disease by injecting the heart muscle with stem cells.

Explain how this could improve the lives of people with heart disease.

[3]

- 16(a).** The diagram shows a tulip plant. Many gardeners like to grow tulip plants.



Tulips can be grown from seeds produced from sexual reproduction.

They can also be grown from bulbs that are produced by asexual reproduction.

Which statements explain why gardeners usually choose to plant bulbs that were produced asexually?

Tick (✓) **two** boxes.

- Bulbs will grow much faster than seeds.

☐
- The gardener will know the colour of the flowers from bulbs.

☐
- Tulip plants grown from seed will not need to photosynthesise.

☐
- Tulips grown from seeds will not require water.

☐
- Tulips grown from seeds will all look exactly the same.

☐

[2]

(b). In 1637, tulip growers found that a small number of their tulip plants produced flowers with different coloured stripes.

The growers did not know what was causing the colour changes.

Complete the sentences to show **two** possible explanations for the colour changes.
Use words from the list.

antibody	gene	mutation
pathogen	phenotype	producer

The tulips could be diseased because they have been infected by a

This has altered the production of a chemical that colours the flowers.

Another explanation is that a has occurred in the DNA of the tulip.

This is a change in the that codes for a coloured chemical.

[3]

(c). It was not until 1960 that scientists could show that the tulips were infected with a virus.

Viruses are much smaller than human cells.

Suggest why it took so long to identify the cause of the infection.

[1]

Although infected bulbs produced attractive flowers, growers found that the bulbs became weaker every year until they died.

- Dig up and burn any tulips as soon as they show signs of infection.
- Spray their fields with insecticides.

[illegible]

[6]

A line drawing of a human heart in profile, facing left. The Aorta is the large artery at the top. The Right coronary artery is shown branching out along the right side of the heart. The Left coronary artery is shown branching out along the left side of the heart. A circular inset at the bottom right provides a magnified view of the branching of the left coronary artery, with a label 'Area of heart muscle' pointing to it.

Complete each sentence below about the diagram. Use words from the list

attack	carbon dioxide	fat	fibre
infection	nitrogen	oxygen	water

Heart disease is caused by blocking the blood vessels that supply the heart muscle.

This means that the area of heart muscle circled in the diagram will not get enough glucose or for respiration.

This may cause it to stop beating. This is called a heart

[3]

(b). Which factors can **increase** the risk of a person getting heart disease?

Tick (✓) **two** boxes.

eating vegetables	
inheriting certain genes	
regular exercise	
smoking cigarettes	

[1]

18(a). Measles is an infectious disease caused by a virus.

Most people recover well from measles but often get other diseases afterwards.
Doctors think that this is because the measles virus weakens the immune system.

Name **one** other virus that severely weakens the immune system.

[1]

(b). Measles spreads easily from one person to the next as it spreads through the air.

- i. Describe **one** way that a person who has measles can try and reduce the chance of passing it on to another person.

[1]

- ii. Describe **one** way that the natural defence mechanisms of the human body may prevent the virus from entering the lungs.

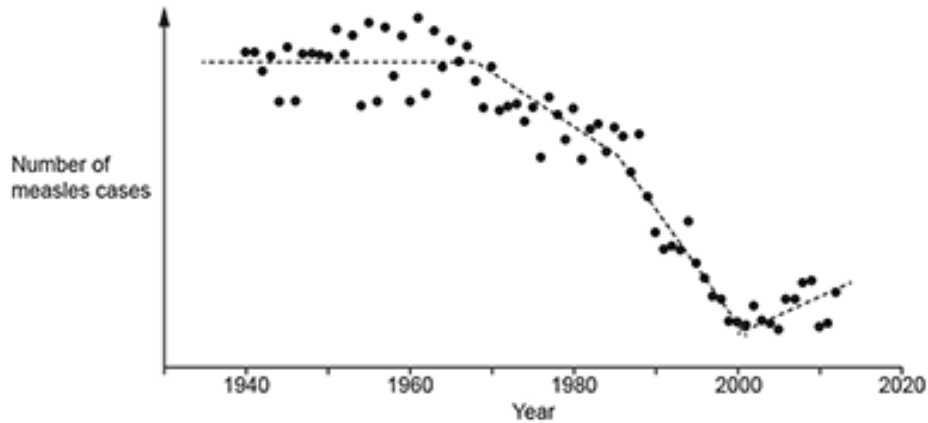
[2]

(c). A vaccine is available to protect people against measles.

What does the measles vaccine contain to provide this protection?

[1]

(d). The graph shows the number of cases of measles in the UK from 1940 to 2012.



During these years, two events have affected the number of measles cases.

- i. In 1968, vaccinations against measles started for children.

Explain the effect that this had on the number of measles cases.

[2]

- ii. In 1998, a report claimed a link between the measles vaccine and an increased risk of a disorder called autism.

Explain the effect that this had on the number of measles cases.

[2]

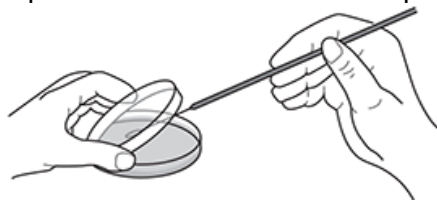
19. Which disease is classed as a communicable disease?

- A Cirrhosis of the liver
- B Tuberculosis
- C Type 1 diabetes
- D Type 2 diabetes

Your answer ☐

[1]

20. A student is inoculating a sterile agar plate with bacteria from a loop.



Why does the student keep the lid of the Petri dish at an angle?

- A** To prevent condensation collecting on the lid.
- B** To reduce the chance of bacteria from the agar escaping into the air.
- C** To reduce the number of microbes from the air landing on the agar.
- D** To stop alcohol from evaporating off the loop.

Your answer ☐

[1]

21. Which is a description of an antibiotic?

- A** A chemical group on the surface of a pathogen.
- B** A chemical that kills bacteria or stops them dividing.
- C** A drug that is used to kill viruses.
- D** A protein molecule made by white blood cells.

Your answer ☐

[1]

22. Which row in the table gives correct descriptions of physical and chemical plant defence responses to disease?

	Description of a physical response	Description of a chemical response
A	thickened leaf cuticle	thickened cell wall
B	thickened cell wall	thickened leaf cuticle
C	production of antimicrobial substances	thickened leaf cuticle
D	thickened cell wall	production of antimicrobial substances

Your answer ☐

[1]

END OF QUESTION PAPER