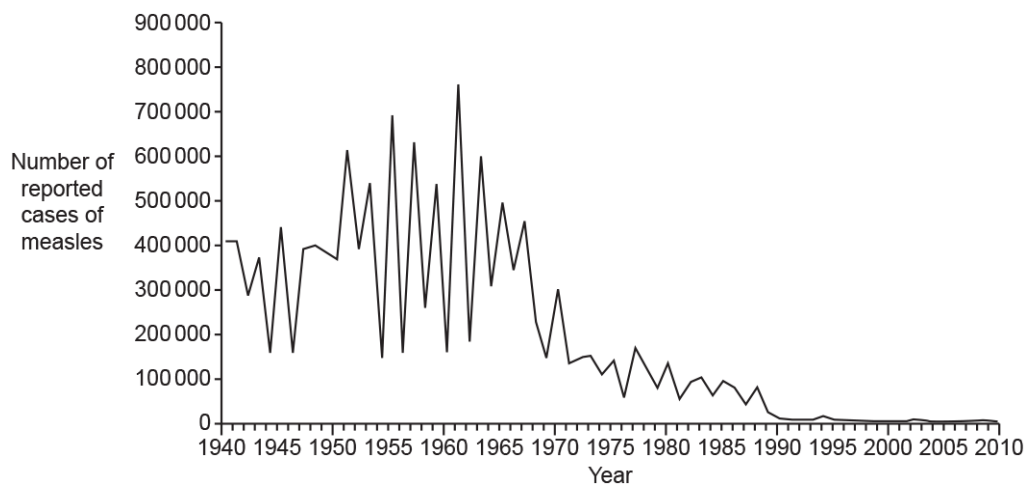# Monitoring & Maintaining Health (F)

1. The graph shows the number of reported cases of measles in England and Wales between 1940 and 2010.

In which year was the measles vaccine likely to have been introduced?

A   1940
B   1952
C   1968
D   1982

Your answer [   ]   **[1]**

2. Look at the table.

It shows the death rates from coronary heart disease (CHD) in the UK in 2008.

Death rates from CHD per 100,000 population			
Age 55–64		Age 65–74	
men	women	men	women
175	47	443	179

In 2008 the total number of deaths per 100 000 in both age ranges was 844.

What percentage of these deaths were women?

   A. 5.6%
   B. 21.2%
   C. 22.6%
   D. 26.8%

Your answer [   ]

[1]

3. The drawing shows a leaf from a tobacco plant that has tobacco mosaic disease.

What type of pathogen causes tobacco mosaic disease in plants?

A   Bacterium
B   Fungus
C   Protist
D   Virus

Your answer [   ]

[1]

4. Fanconi anaemia is a genetic disorder. The disorder causes a decrease in the number of platelets in the blood.

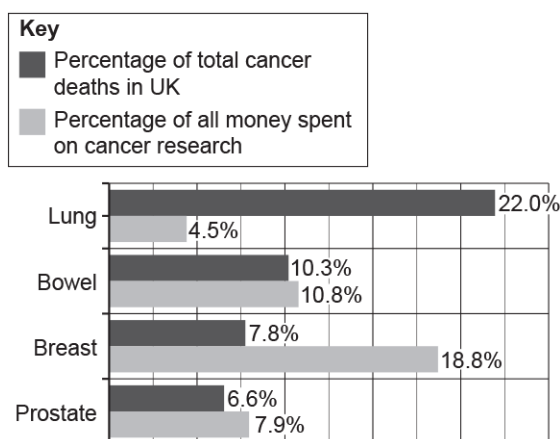Write down **one** possible symptom of Fanconi anaemia.

---**[1]**

5 (a). Treatment for cancer often involves powerful medicines that stop cells dividing all over the body.

Write down the name of the type of cell division that occurs when body cells divide.

---**[1]**

(b). The graph shows information about the four most common types of cancer in the UK.

Which type of cancer has the **largest** difference between the percentage of total deaths and the percentage of money spent on research?

Tick (✓) **one** box.

Lung ☐

Bowel ☐

Breast ☐

Prostate ☐

[1]

6. Scientists have tested the genes of a number of people who have diabetes.

They have found that there are about four different versions of a gene that can cause diabetes.

Why might this discovery be important?

        A.   Diabetes cannot be treated at the current time.
        B.   Different patients with diabetes can be given different drugs.
        C.   All types of diabetes can be treated by changing the diet.
        D.   Glucagon injections will be able to treat these four types of diabetes.

Your answer ☐

[1]

7. Stem cells are used in treating some medical conditions because they:

        A.   are unspecialised
        B.   bind to and immobilise pathogens
        C.   destroy cancer cells
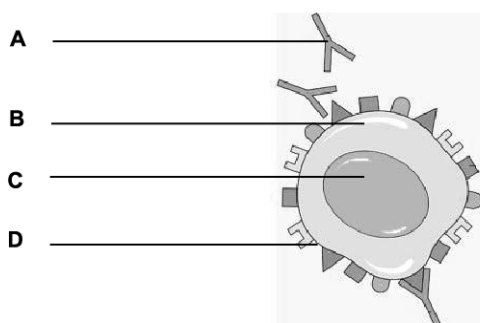   D.   differentiate into many different types of cell.

Your answer ☐

[1]

8. Monoclonal antibodies can be used to treat some kinds of cancer.

Look at the diagram of a cancer cell.

It is being treated using monoclonal antibodies.

Which label, **A**, **B**, **C** or **D**, shows the monoclonal antibodies?

Your answer ☐

[1]

9. New medicines are tested before they can be used.

There are people that object to some forms of testing.

Which form of testing is likely to cause the **least** objection?

    A.   animal testing
    B.   computer simulation testing
    C.   human tissue testing
    D.   microbial testing

Your answer ☐

[1]

10. Which of these examples of human defence mechanisms against disease is non-specific?

    A.   antibodies in the blood system
    B.   memory cells
    C.   hydrochloric acid in the stomach
    D.   lymphocytes

Your answer ☐

[1]

11. Different diseases are caused by different pathogens.

Which row in the table shows the type of pathogen that causes each disease?

	HIV / AIDS	**Tobacco Mosaic Disease**
A	virus	virus
B	bacterium	virus
C	bacterium	fungus
D	virus	fungus

Your answer ☐

[1]

12. Which is a **chemical** defence of plants?

    A   Antimicrobial substances

    B   Cell walls

    C   Leaf cuticles

    D   Thorns

Your answer [ ]   **[1]**

13. Heart disease affects a large number of people.

Which of these factors contributes to heart disease?

    A.   lack of exercise

    B.   low fat diet

    C.   being a non-smoker

    D.   not drinking alcohol

Your answer [ ]

[1]

14. Why is it difficult to kill cancer cells in the body?

    A.   They are foreign cells that are not destroyed by antibiotics.

    B.   They are body cells and so the body's defence system does not attack them.

    C.   They hide inside other body cells away from the body's defences.

    D.   They divide very slowly.

Your answer [ ]

[1]

15. New drugs are tested on humans, animals and tissues.
In which order are they tested?

    A.   tissues – humans – animals

    B.   humans – animals – tissues

    C.   animals – tissues – humans

D.   tissues – animals – humans

Your answer ☐

[1]

16. Scientists want to make human stem cells from body cells rather than getting stem cells from embryos.

Why is this?

A.   Stem cells cannot be found in human embryos.
B.   Some people object to destroying human embryos.
C.   The cells in human embryos are all differentiated.
D.   Human embryos are single-celled.

Your answer ☐

[1]

17. What may a vaccine contain?

A.   small numbers of live harmful microbes
B.   dead microbes
C.   antibiotics specific to the microbe
D.   memory cells

Your answer ☐

[1]

18. Different diseases are caused by different pathogens.

Which type of pathogen causes tobacco mosaic disease?

A.   a bacterium
B.   a fungus
C.   a virus
D.   a protist

Your answer ☐

[1]

A   Cause the body to produce antibodies.
B   Cause the release of antigens.
C   Contain antiviral drugs.

D   Make platelets more active.

19. Which statement describes how vaccines work?

Your answer

[1]

20. Tears and stomach juices are important in the body's response to pathogens.

	Tears	Stomach juices
A	Acid	Antibiotics
B	Antibiotics	Antibodies
C	Antibodies	Lysozyme
D	Lysozyme	Acid

Which row of the table correctly describes what substances are found in tears and stomach juices?

Your answer [   ]   **[1]**

21. Look at the bacterial cell that causes disease in humans.

0.0008 mm
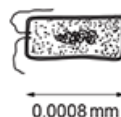
The human eye can see objects 0.1 mm in size.

What **minimum** magnification will be needed before the eye can see this bacterial cell?

A   12.5×
B   125×
C   1250×
D   12500×

Your answer [   ]   **[1]**

22. What do most vaccines contain?

    A   Antivirals

    B   Dead or weakened pathogens

    C   Specific antibiotics

    D   White blood cells

Your answer [   ] **[1]**

23. Which of these gives a correct risk factor for the named disease?

	Disease	Risk factor
A	bronchitis	exercise
B	cardiovascular disease	diet rich in saturated fat
C	type 1 diabetes	alcohol
D	cirrhosis of the liver	smoking

Your answer [   ] **[1]**

24. Which statement about health is true?

    A   Health is the absence of disease.

    B   A person who is free from disease must be healthy.

    C   A person can have a serious disease and be healthy.

    D   A person can be free from disease and not be in good health.

Your answer ☐   **[1]**

25. Probash is ill and is having tests in hospital.

His doctors monitor his body temperature frequently.

Explain why it is important to monitor Probash's body temperature frequently.

_____

_____**[2]**

26. Erythromycin is an antibiotic drug.

What is an antibiotic?

_____

_____

_____**[2]**

27. Some people get very painful headaches called migraines. Scientists think that these are caused by a protein in the brain called CGRP. Levels of the CGRP protein are higher in the brains of people who get migraines.

Doctors are trying to find a treatment to prevent migraines. They have produced an antibody against the CGRP protein.

Complete these sentences to describe how **antibodies** are made in the body.

Use words from the list.

Each word can be used once, more than once, or not at all.

antibiotics   antigens   antivirals

platelets   red blood cells   white blood cells

Foreign cells have chemical groups on their surface called ....

These chemical groups are detected by .... which then produce antibodies.

                                                                                                [2]

28. Sometimes the body's defence mechanisms do **not** work and pathogens enter the body.
They may then be treated with antibiotics.

What is an antibiotic?

_____

_____

_____**[2]**

29 (a). Some people get very painful headaches called migraines. Scientists think that these are caused by a protein in the brain called CGRP. Levels of the CGRP protein are higher in the brains of people who get migraines.

Doctors are trying to find a treatment to prevent migraines. They have produced an antibody against the CGRP protein.

The doctors test the antibody treatment on migraine patients.

The patients are divided into two groups:

- One group is given an injection of the antibody.
- The second group receives an injection of a placebo which does not contain the antibody.

They record the mean number of days each patient had migraines before and after treatment.

The table shows their results.

Treatment	Mean number of migraine days per patient **before treatment**	Mean number of migraine days per patient **after treatment**	Percentage decrease in migraine days per patient
antibody injection	9.1	4.4	51.6
placebo	9.1	6.4	29.7

    i.   The placebo group does **not** receive the antibody.

        Suggest why this group is included in the study.

-- **[1]**

    ii.   The total number of **migraine days** for the patients on the placebo **after treatment** was 480.

        The mean number of migraine days per patient after treatment was 6.4.

        Calculate the number of patients in the placebo group.

Number of patients = ... **[2]**

(b). Explain why it is important that a second group of doctors should repeat this test.

-- **[2]**

30. Fanconi anaemia is a genetic disorder. The disorder causes a decrease in the number of platelets in the blood.

Fanconi anaemia also causes a decrease in white blood cells and red blood cells.

The table shows ranges for blood components in people **without** Fanconi anaemia.

Blood component	Number per mm³
red blood cell	4.5 million – 6.5 million
white blood cell	6.0 thousand – 16.0 thousand
platelet	0.15 million – 0.40 million

    i.   The diagram shows a microscope slide containing blood from a patient.
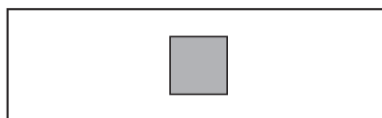
The volume of blood under the slide is 0.1 mm³ and it contains 1000 white blood cells.

Calculate the number of white blood cells per mm³ of blood.

Number = ... per mm³ **[2]**

    ii.   Does the blood sample provide evidence that the patient has Fanconi anaemia?

Use the table and your answer to part **(i)** to justify your answer.

---**[1]**

31. Look at the list of four diseases.

AIDS

Type 2 diabetes

Crown gall disease

Barley powdery mildew

Write each disease in the correct column of this table.

Communicable disease			Non-communicable disease
Caused by a disease bacterium	Caused by a fungus	Caused by a virus	

[3]

32. Look at the graph.

It gives data about people of different ages in one area.

It shows the number of cases of rheumatic fever.

It also shows the number of new cases of heart problems caused by rheumatic fever.
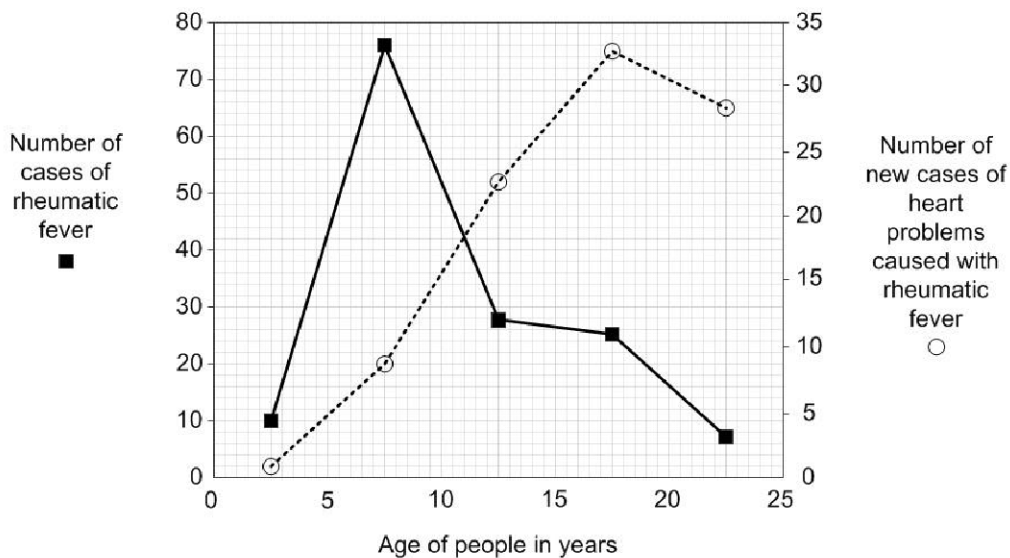
i.   At what age do you most commonly find people with rheumatic fever?

       answer = ……………………………… years   [1]

ii.   How many years after getting rheumatic fever is it most common to get heart problems?

How can you tell this from the graph?

--**[2]**

33. Angina is caused by a problem in the arteries that supply the heart muscle.

Fatty material (cholesterol) builds up in these arteries.
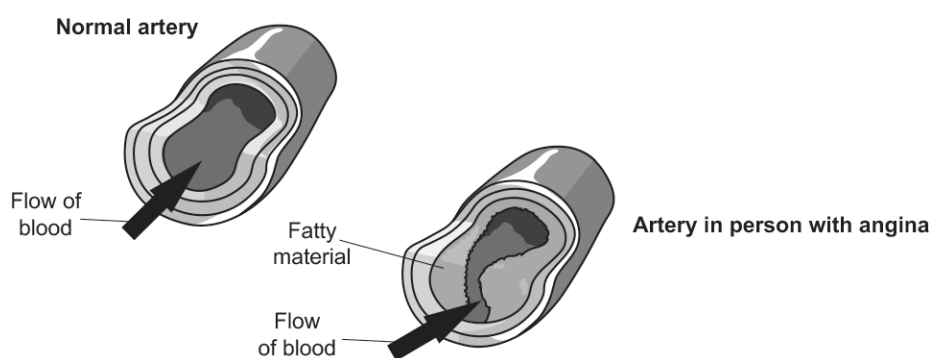
In angina the heart muscle starts to carry out anaerobic respiration.

Explain why this happens.

Use the information in the diagram and your biological knowledge.

--**[3]**

34. Erythromycin is an antibiotic drug.

It is important to get the dose of erythromycin right.

Too much erythromycin can be harmful.

However, recently some strains of bacteria have developed resistance to low concentrations of erythromycin.

To see how effective erythromycin is, it is tested using bacteria grown on agar plates.

This method is used:

- A petri dish is used that has the bacteria growing evenly over the surface.
- A disc of filter paper is soaked in erythromycin.
- The disc is placed on the agar in the centre of the petri dish using sterile forceps.
- The dish is incubated at 37°C.

i.   Why did the scientists incubate the dish at 37°C rather than at higher or lower temperature?

--- **[2]**

ii. Why is the filter paper disc moved using sterile forceps?

--- **[1]**

35. There are several treatments for coronary heart disease (CHD).

One of these is an operation.

In this operation, doctors insert a metal grid called a stent into the artery.

Artery

Deflated
balloon inside
a metal stent

Tube

The balloon is then inflated

Stent

The balloon is removed and
the stent is left in place
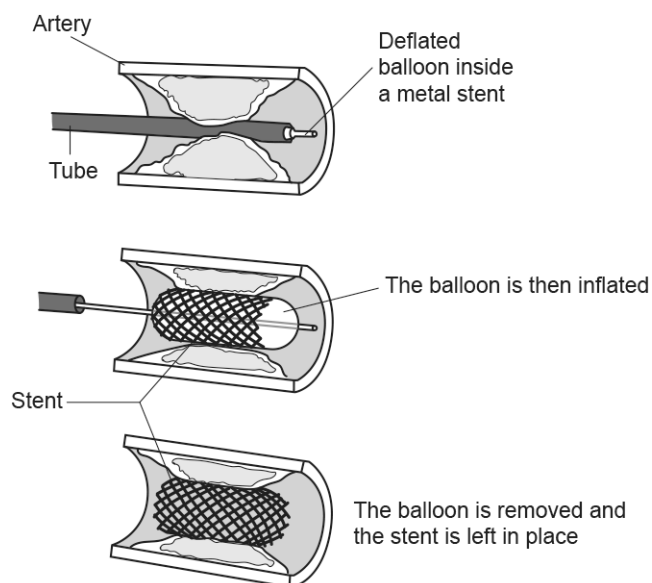
    i.   Look at the diagram.

           Why does using a stent help treat CHD?

--**[2]**

    ii.   Taking a drug called statins is a treatment for CHD.

           The drug is taken every day and lowers the level of cholesterol in a person's blood.

           Suggest one **advantage** and one **disadvantage** of taking statins.

           Advantage

           Disadvantage

             --**[2]**

36. Retinitis pigmentosa is a genetic condition.

It is caused by a mutation to a gene. This mutation produces a recessive allele.

If people have retinitis pigmentosa then the cells in their retina are damaged.

    i.   Scientists want to use stem cells as a treatment for this condition.

            Why might stem cells be able to repair the retina?

--- **[2]**

    ii.   Write down **two** reasons why medical treatments are tested on animals first.

--- **[2]**

37. Different parts of the body's have natural defence mechanisms to stop pathogens infecting the body.

These defences include:

- skin
- tears
- secretions from the stomach.

Describe how each defence stops pathogens infecting the body.

--- **[4]**

38. Sinusitis is an infection that can be caused by bacteria or viruses.

Sinusitis causes a runny nose and bad headaches.

    i.   Doctors only give antibiotics to patients with these symptoms if they are sure their illness is caused by bacteria.

        Write down **two** reasons why.

1

2

----

[2]

    ii.   Look at the graph. It shows the length of time that patients show symptoms of sinusitis.
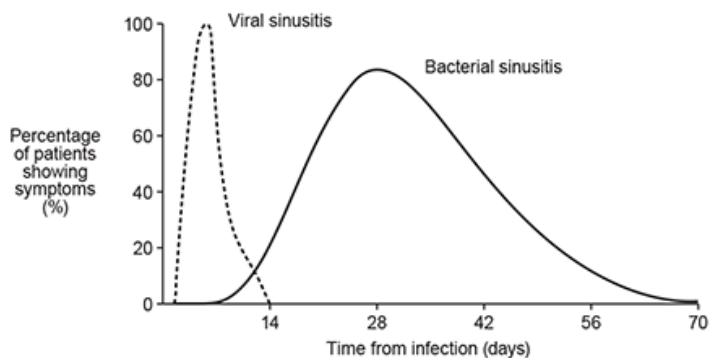
Doctors usually wait 14 days after infection before giving patients antibiotics for sinusitis.

Use the graph to explain why.

---**[2]**

39 (a). Scientists investigate antibiotic pollution in two different lakes.

They collect samples of water from the two lakes. The scientists then use aseptic techniques to investigate how resistant the bacteria in the water are to antibiotics. **Fig. 22.2** shows the apparatus they use.

| Petri dish containing agar | Filter paper discs containing antibiotic | Sterile forceps | Beaker containing lake water |

| Sterile pipettes | Ruler |

Fig. 22.2

Describe how the scientists could use **this** apparatus to **measure** how resistant the bacteria are to antibiotics.

_____

_____

_____

_____

_____

_____

_____

_____**[4]**

(b). The scientists also counted how many species of bacteria were resistant to antibiotics and how many species of bacteria were killed by antibiotics.

The scientists found these results.

	Number of different species of bacteria	
	In Lake Bellandur	In Lake Jakkur
Resistant to antibiotics	53	35
Killed by antibiotics	28	37

Which lake has the **highest** levels of antibiotic pollution?

Tick (✓) **one** box.

Lake Bellandur ☐

Lake Jakkur ☐

Explain your answer.

---**[2]**

40. Probash is ill and is having tests in hospital. Probash's doctors want to check that the bacteria causing his illness are not resistant to the antibiotic erythromycin.

They set up an experiment to test this.

This is the method they use:

- a petri dish is made that has the bacteria growing evenly over the surface
- a disc of filter paper is soaked in erythromycin
- the disc is placed on the agar in the centre of the petri dish
- the lid of the dish is fixed on with a piece of tape
- the dish is then incubated.

   i.   Why did the doctors tape the lid on the petri dish?

_____[1]

   ii.   The diagram shows the doctor's results.
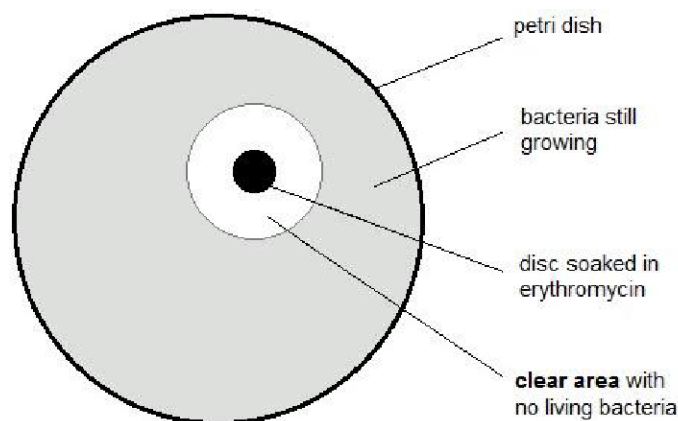
Use a ruler to measure the diameter of the **clear area** in mm.

Use this diameter to calculate the area of the circle where there are no living bacteria.

(the area of a circle = πr^2 and π = 3.14)
area = …………………………………………………… mm^2

[3]

   iii.   This table is used to analyse the results of the experiment.

Area clear of bacteria including the area of the disc (mm^2)	Level of resistance
less than 133	resistant
133 to 416	intermediate resistance
more than 416	not resistant

Use your result from part **(ii)** to judge the level of resistance in the microbe.

_____[1]

41. A chemical in stevia leaves makes them taste sweet. This chemical is **not** a sugar.
People with diabetes need to know if the food they eat contains sugar.

i.   Describe how you could test some stevia leaves to prove that they do **not** contain sugar.

Reagent used

Method

Expected result

    ---**[3]**

ii.   Will using stevia in foods help people with type 2 diabetes?

        Explain your answer.

---**[2]**

42. Angina is often the first sign of a disease called coronary heart disease (CHD).

The table is used to estimate the risk of getting CHD. The more points a person scores, then the higher the risk of getting CHD.

Risk factor	Number of points		
	1	2	3
Age in years	<20	21–30	31–40
Blood cholesterol level	Low	Medium	High
Number of cigarettes smoked per day	0	1–10	11–20
Mass	Below average	Average	Above average
Number of parents with coronary heart disease (CHD)	0	1	2

i.   How many points are scored by smoking 20 cigarettes a day?

---**[1]**

ii.   What is the effect of age on the chance of getting CHD?

--**[1]**.

iii.   Here is some information about two people.

Person A	**Person B**
25 years old	19 years old
Non-smoker	Smokes 20 cigarettes a day
Low blood cholesterol level	Low blood cholesterol level
Average mass	Below average mass
One parent with CHD	No parents with CHD

Use the table to work out whether Person A or Person B is most likely to develop CHD.

Show how you worked out your answer.

--**[3]**.

43. Erythromycin is an antibiotic drug.

   i.   It is important to get the dose of erythromycin right.

Too much erythromycin can be harmful.

However, recently some strains of bacteria have developed resistance to low concentrations of erythromycin.

To see how effective erythromycin is, it is tested using bacteria grown on agar plates.

This method is used:
- A petri dish is used that has the bacteria growing evenly over the surface.
- A disc of filter paper is soaked in erythromycin.
- The disc is placed on the agar in the centre of the petri dish using sterile forceps.
- The dish is incubated at 37°C.

The diagram shows the actual size of the dish after incubation.
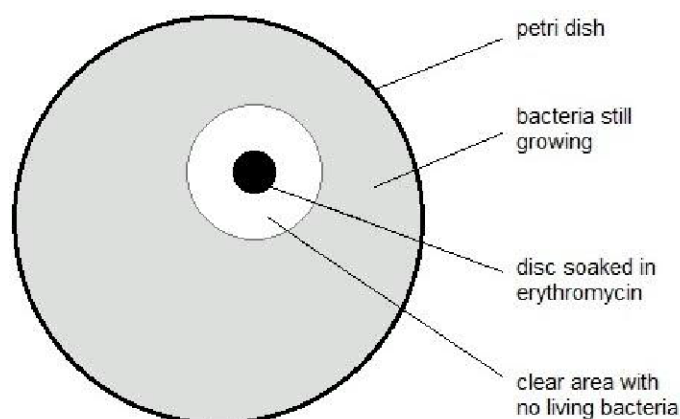
This table is used to analyse the results of the experiment.

Area clear of bacteria including the area of the disc in mm^2	Level of resistance
less than 133	resistant
133 to 416	intermediate resistance
more than 416	not resistant

Use the results of the experiment and the table to judge the level of resistance in this strain of bacteria. (The area of a circle = Πr^2 and Π = 3.14.)

answer = ……………………………………………… mm^2 **[3]**

ii.   Suggest any limitations to measuring the level of resistance with this method.

---**[2]**

44. Strokes are a type of cardiovascular disease.

One cause of a stroke is an artery in the brain bursting.

Hemorrhage

Blood bursts through wall

Strokes can have many risk factors.

Scientists are trying to investigate whether the risk of having a stroke is increased by pollution.

They looked at data from 28 different countries, involving six million people.

They looked at the number of people who had a stroke soon after an increase in pollution.

They compared this to the number of people who had a stroke after no increase in pollution.

This formula was used to produce a risk factor:

risk factor = number of people who had a stroke soon after an increase in pollution
number of people who had a stroke after no increase in pollution

The graph shows their results.
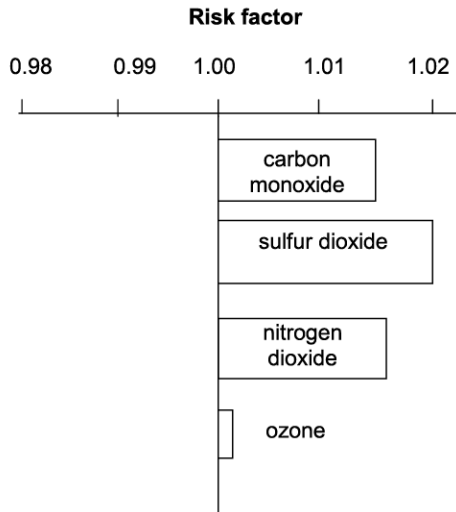
Risk factor

i. If the risk factor for a pollutant was 1.00, what conclusion could the scientists make?

-- **[2]**

ii. Which pollutant is least likely to be a risk factor for a stroke?

-- **[1]**

iii.   The risk factors calculated by the scientists are quite small.

However, they still think that pollution is an important factor in strokes.

How did the nature of the data they used help to convince them of this?

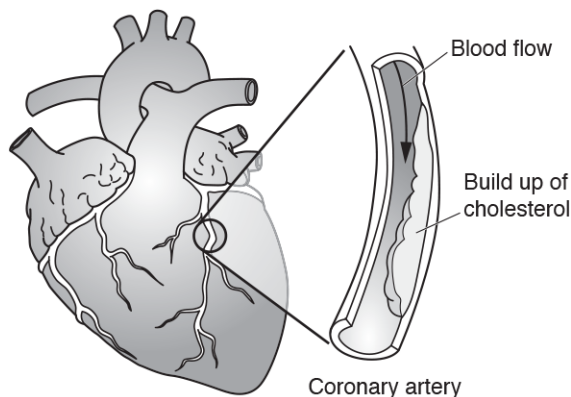---

---**[2]**.

45. Hypercholesterolemia (HC) is caused by a dominant allele on chromosome 19. This allele has mutations which cause a change in the order of DNA nucleotides.

* People with HC are more likely to get heart disease. The diagram shows the heart of a person who has heart disease.

The graph shows the results of a study of men aged 30 to 49. The study measured the cholesterol levels in the blood of the men. It also recorded if the men developed signs of heart disease.
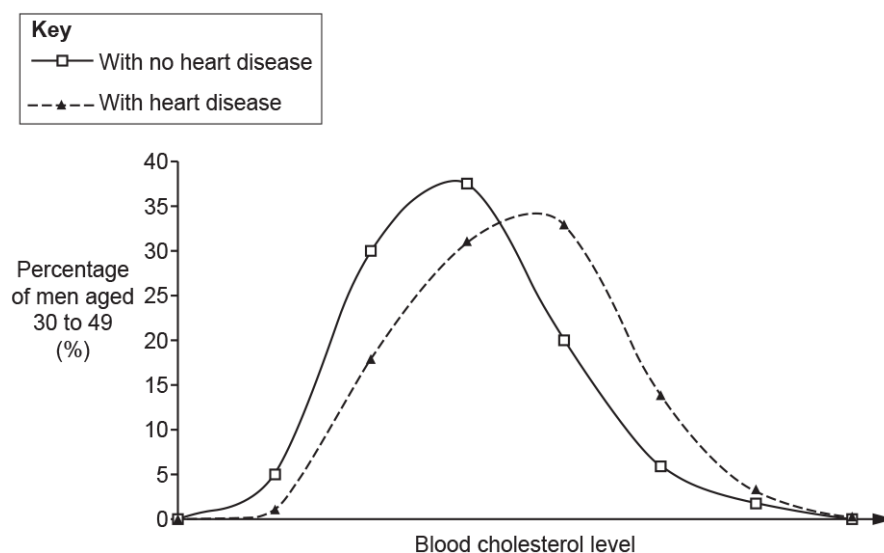
Explain the possible link between cholesterol and heart disease and if this link is supported by the graph.

Use evidence from the diagram and the graph in your answer.

---**[6]**

46. Rheumatic fever is a rare disease in the UK.

Look at this information.

Rheumatic fever information leaflet
Bacteria can enter the mouth and cause sore throats.
This may develop into rheumatic fever.
Rheumatic fever is much more likely if a person does not get enough food or lives in overcrowded conditions.
White blood cells in the body make protein molecules to kill these bacteria.
However, sometimes these molecules attack heart valves making them leaky.

i.   Put ticks (✓) in the **two** boxes that best describe rheumatic fever.

a communicable disease	
a disease that is caused by defective alleles	
a non-communicable disease	
a disease that is affected by lifestyle	

[1]

ii.   White blood cells make protein molecules to kill the bacteria.

What is the name of these protein molecules?

---**[1]**

iii.   The diagram shows one of the valves that can be made leaky by rheumatic fever.

valve

People who have this leaky valve often have these symptoms:

o   they get out of breath easily
o   they do not seem to have much energy and feel tired.

Write about the job of this valve and how damage to it may cause these symptoms.

---**[4]**.

47 (a). A salt marsh is a large, muddy area of land where a river joins the sea.

Student **A** and student **B** study the plants growing on a salt marsh.

They both sample the plants present by laying out two tape measures at right angles across the salt marsh.

They then place a square frame on the ground in different places and count the number of plants in the square, as shown below.

What is the name of the square frame that they use to sample the plants?

_____**[1]**

(b). The diagrams show the position of each student's samples across the salt marsh. Each small square in the diagrams represents one sample.

Student A's sampling

Student B's sampling
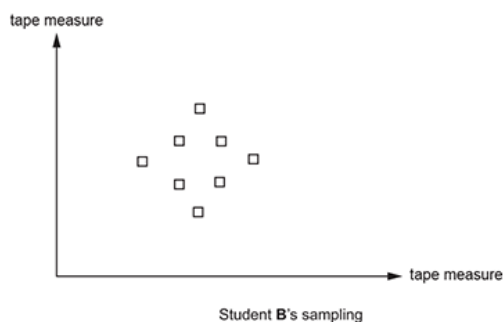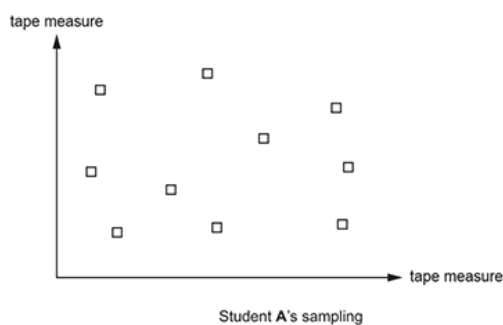
i. The whole salt marsh has an area of 2500 m².

Each square frame has an area of 0.25 m².

Calculate the percentage of the whole salt marsh that was sampled by student A.

Percentage = ... % **[3]**

ii. Look at the two students' sampling shown in the diagrams.

Explain which student is likely to get the most accurate estimate for the number of plants in the salt marsh.

student

----

explanation

----

[3]

iii. Their teacher said that they should take care as there may be harmful bacteria in the salt marsh.

State **two** things that the students could do to reduce the risk of infection from the harmful bacteria.

1

2

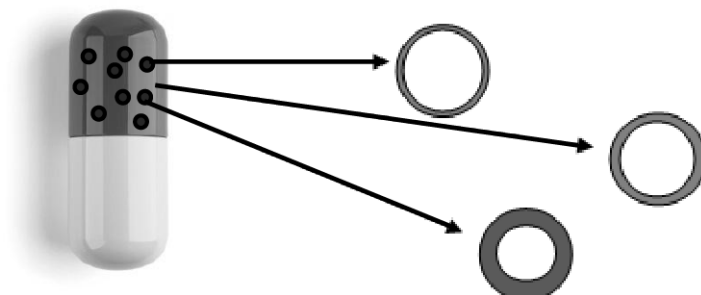
[2]

48. Erythromycin is an antibiotic drug.

Erythromycin is usually given to patients in a capsule.

The capsule has lots of small spheres containing the drug.

The walls of the spheres are different thicknesses.

They are made of a carbohydrate polymer.

    i.   Explain why the drug is released from the spheres in the small intestine.

---**[2]**

    ii.   * The graph shows the levels of erythromycin in the blood when given using this capsule
          and in a normal tablet.
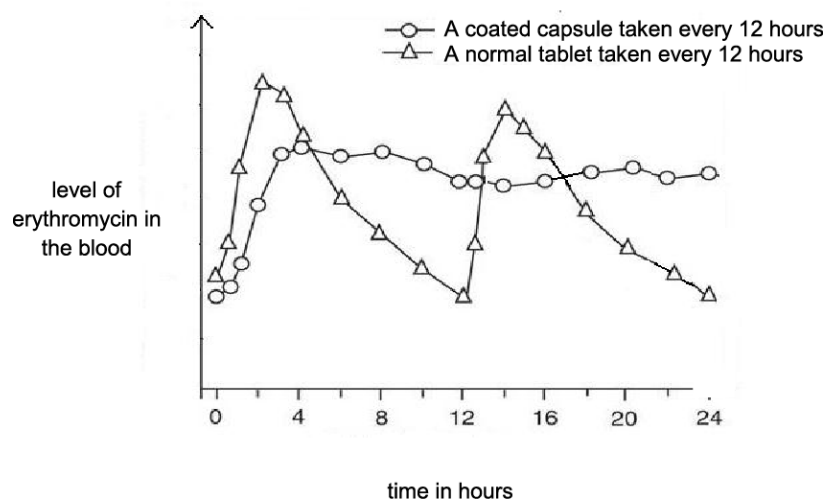
Explain the shape of the two graphs and why it is better to give erythromycin in capsules.

---**[6]**

END OF QUESTION PAPER