Cell Biology part 8 AQA Combined Science

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Name: _____

Class: _____

Date: _____

Time: **72 minutes**

Marks: **67 marks**

Comments:

Q1.

Plants have tissues that are specialised for the transport of food and water molecules.

(a) Which is a description of the role of the xylem?

Tick **one** box.

- Transports dissolved sugars using translocation ☐
- Transports starch in the transpiration stream ☐
- Transports water in the transpiration stream ☐
- Transports water using translocation ☐

(1)

(b) Which is a description of the role of the pholem?

Tick **one** box.

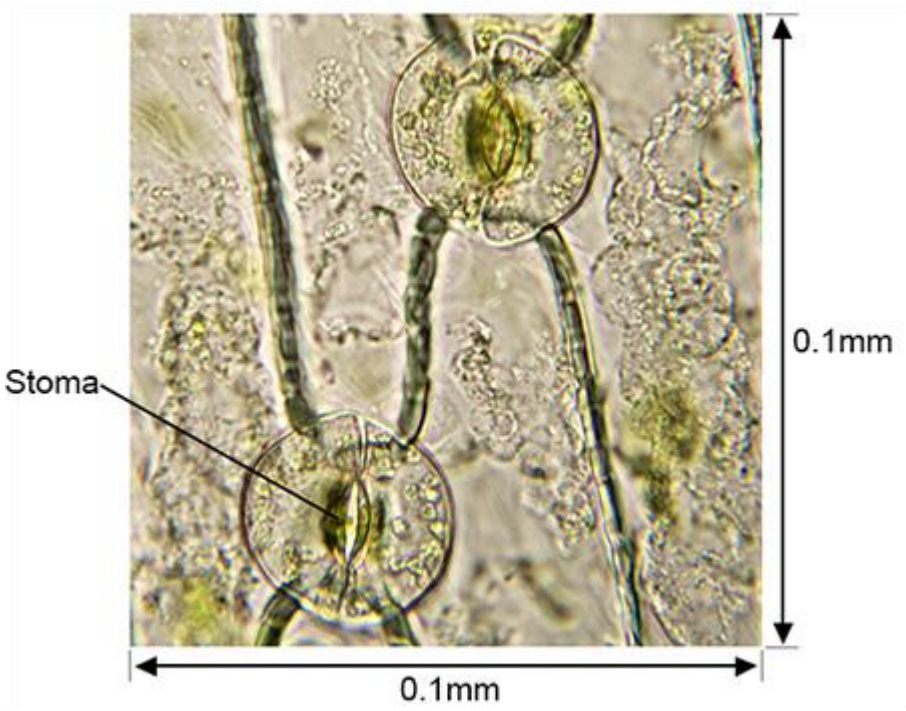
- Transports dissolved sugars in the transpiration stream ☐
- Transports dissolved sugars using translocation ☐
- Transports starch using translocation ☐
- Transports water in the transpiration stream ☐

(1)

In plants water is lost through stomata.

Figure 1 shows stomata on the lower surface of a leaf.

Figure 1



(c) Calculate the number of stomata per mm^2 for the leaf shown in **Figure 1**.

Number of stomata = _____

(2)

(d) Most plants have more stomata on the lower surface of a leaf than on the upper surface.

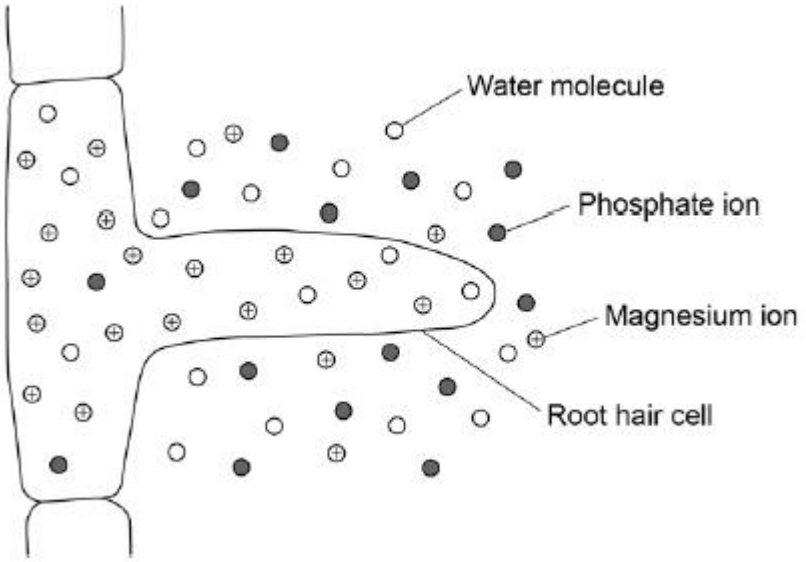
Explain why there are more stomata on the lower surface of a leaf.

(3)

(e) Particles can move into and out of cells by different processes.

Figure 2 shows different particles inside and outside a root hair cell.

Figure 2



Explain the processes by which the different particles would enter the root hair cell.

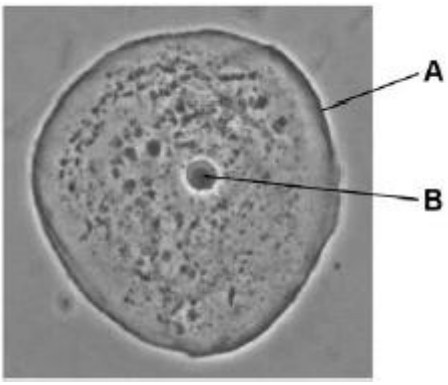
(6)

(Total 13 marks)

Q2.

Figure 1 shows an animal cell.

Figure 1



(a) What is structure **A**?

Tick **one** box.

- Cell membrane ☐
- Cell wall ☐
- Chromosome ☐
- Cytoplasm ☐

(1)

(b) What is structure **B**?

Tick **one** box.

- Chloroplast ☐
- Mitochondria ☐
- Nucleus ☐
- Vacuole ☐

(1)

(c) **Figure 2** shows a sperm cell.

Figure 2

Describe how a sperm cell is adapted to carry out its function.

_____

_____

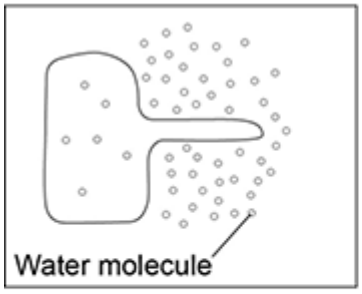
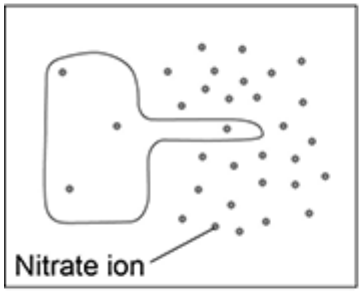
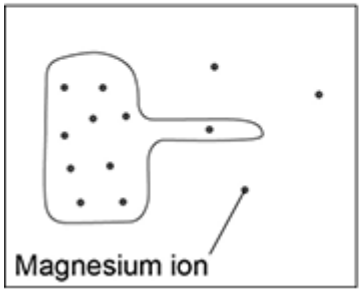
(1)

(d) Substances can move into and out of cells by three processes.

The diagrams show the concentration of different substances inside and outside a root hair cell.

How would each substance move into the root hair cell?

Draw **one** line from each root hair cell to the correct process.

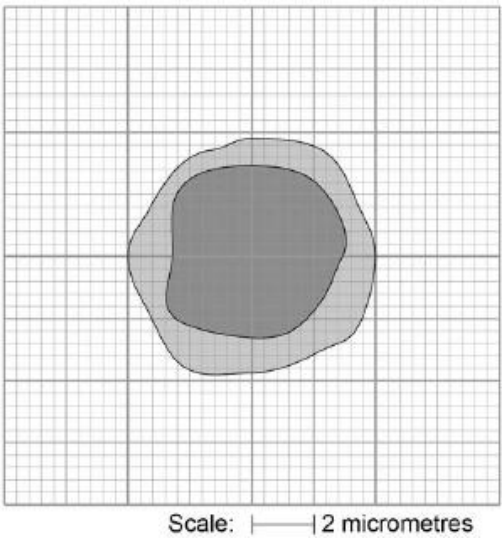
Root hair cell	**Process**
	Active transport
	Diffusion
	Osmosis

(2)

(Total 5 marks)

Q3.

The figure below shows a scale drawing of one type of cell in blood.



(a) Use the scale to determine the width of the cell.

Give your answer to the nearest micrometre.

_____

_____

Width of cell = _____ micrometres

(1)

(b) Complete the table below.

Part of the blood	Function
	Carries oxygen around the body
	Protects the body against infection
Plasma	

(3)

(c) Platelets are fragments of cells.

Platelets help the blood to clot.

Suggest what might happen if the blood did **not** clot.

_____

_____

(1)

(Total 5 marks)

Q4.

When an organism grows, new cells are produced by cell division.

(a) What type of cell division happens to produce new body cells?

Tick **one** box.

Differentiation ☐

Meiosis ☐

Mitosis ☐

(1)

(b) Why can cancers grow very large?

Tick **one** box.

Cancer cells are specialised ☐

Cell division is slow ☐

Cell division is uncontrolled ☐

(1)

(c) Give **one** factor which increases the risk of getting cancer.

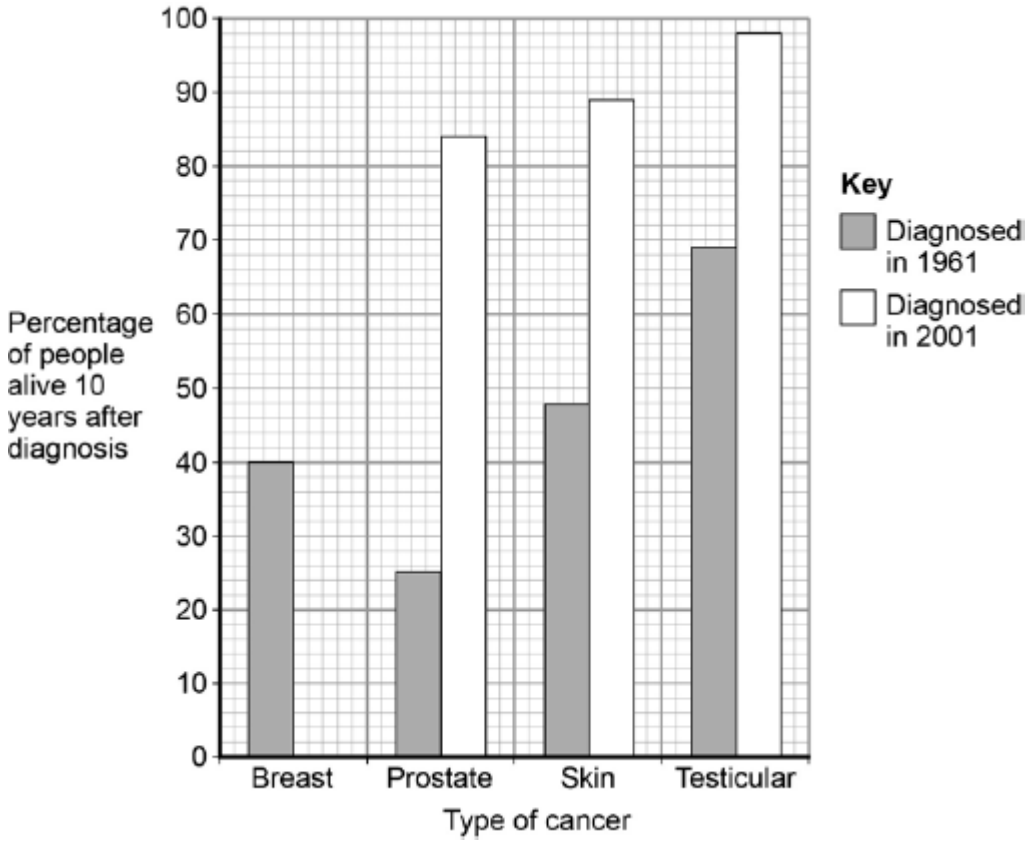
_____

(1)

(d) Survival rates for people with cancer have improved a lot.

People who are alive 10 years after diagnosis are usually considered to be cured.

The figure below shows data for people diagnosed with cancer in 1961 and 2001.



78% of people diagnosed with breast cancer in 2001 were alive 10 years later.

Complete the figure above to show this information.

(1)

(e) Which type of cancer diagnosed in 1961 had the highest survival rate?

Tick **one** box.

Breast ☐

Prostate ☐

Skin ☐

Testicular ☐

(1)

(f) Which type of cancer shows the biggest improvement in the percentage of people alive after 10 years?

Tick **one** box.

Breast ☐

Prostate ☐

Skin ☐

Testicular ☐

(1)

(g) Suggest **two** reasons why the survival rates for all cancers have increased.

1. _____

_____

2. _____

_____

(2)

(Total 8 marks)

Q5.

Pathogens cause infectious diseases in animals and plants.

(a) Draw **one** line from each disease to the type of pathogen that causes the disease.

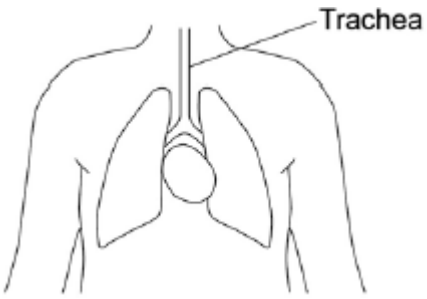
Disease	Type of pathogen
Gonorrhoea	Bacterium
Malaria	Fungus
Measles	Protist
	Virus

(3)

(b) Some parts of the human body have adaptations to reduce the entry of live pathogens.

Look at **Figure 1**.

Figure 1



Explain how the trachea is adapted to reduce the entry of live pathogens.

(4)

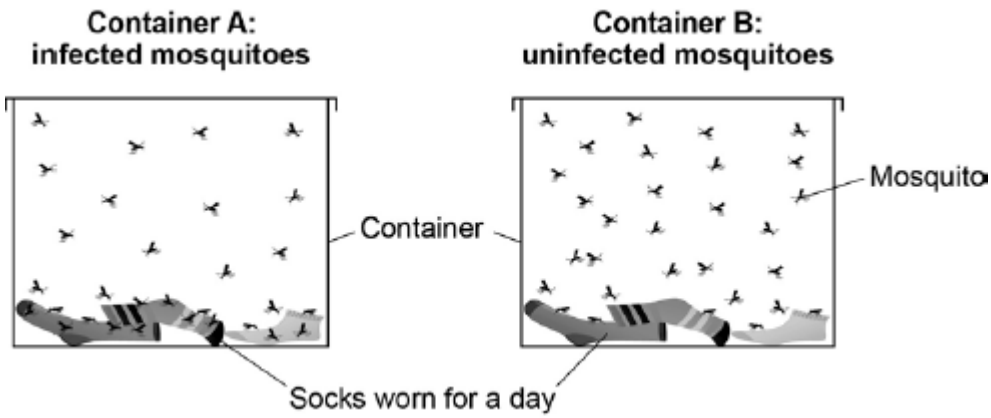
(c) Malaria is a serious disease that can be fatal.

Malaria is spread to humans by infected mosquitoes.

Scientists investigated the behaviour of mosquitoes to understand how the spread of malaria could be controlled.

Figure 2 shows the equipment the scientists used.

Figure 2



This is the method used.

1. 30 mosquitoes **infected with malaria** were placed in Container **A**.

2. 30 **uninfected** mosquitoes were placed in Container **B**.

3. The total number of times the mosquitoes landed on the socks was recorded.

Name the dependent variable and suggest **one** control variable in this investigation.

Dependent variable _____

_____

Control variable _____

_____

(2)

(d) Infected mosquitoes landed on the socks three times more often than uninfected mosquitoes.

Explain how this information can be used to reduce the spread of malaria.

_____

_____

_____

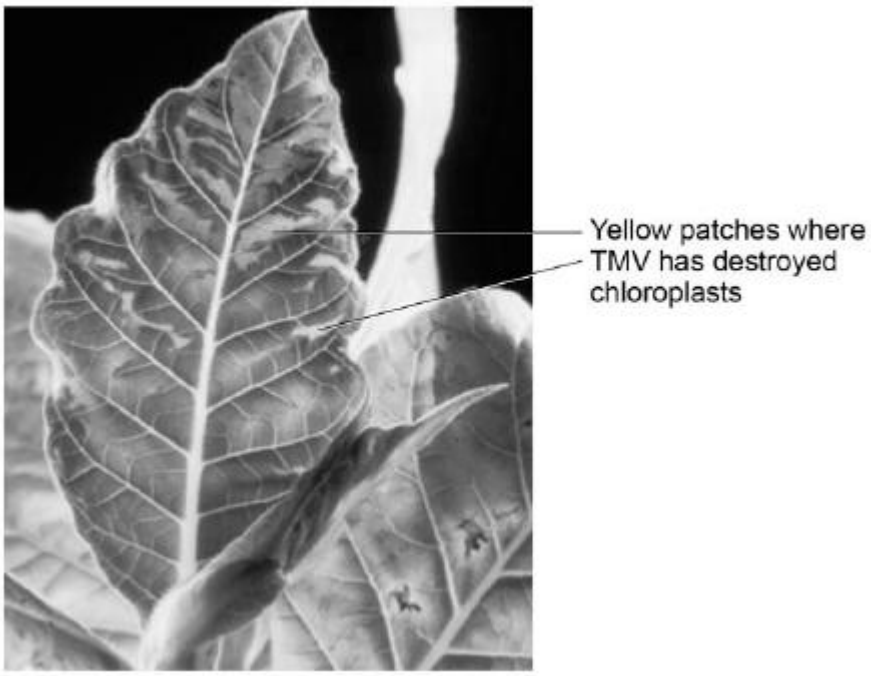
_____

(2)

(e) Tobacco mosaic virus (TMV) affects many species of plant.

Figure 3 shows a leaf infected with TMV.

Figure 3



TMV destroys chloroplasts in the leaf.

Explain how this could affect the growth of the plant.

_____

_____

_____

_____

_____

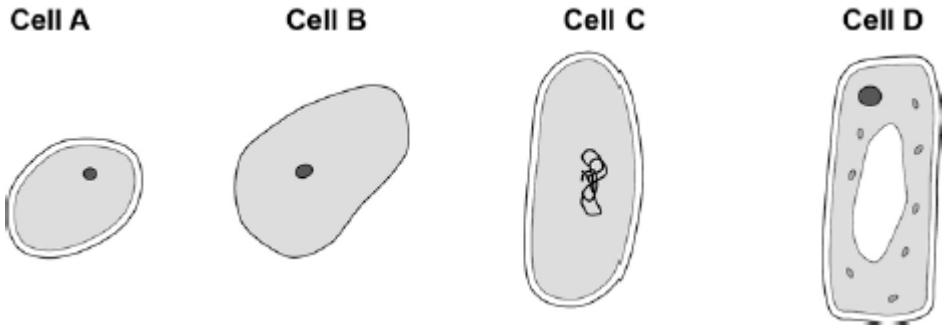
_____

(3)

(Total 14 marks)

Q6.

The figure below shows four different types of cell.



(a) Which cell is a plant cell?

Give **one** reason for your answer.

Cell _____

Reason _____

(2)

(b) Which cell is an animal cell?

Give **one** reason for your answer.

Cell _____

Reason _____

(2)

(c) Which cell is a prokaryotic cell?

Give **one** reason for your answer.

Cell _____

Reason _____

(2)

(d) A scientist observed a cell using an electron microscope.

The size of the image was 25 mm.

The magnification was × 100 000

Calculate the real size of the cell.

Use the equation:

$$\text{magnification} = \frac{\text{image size}}{\text{real size}}$$

Give your answer in micrometres.

_____

_____

_____

Real size = _____ micrometres

(3)

(Total 9 marks)

Q7.

Plants need nitrate ions in order to make proteins.

A plant is growing in soil flooded with water.

Explain why the plant cannot absorb enough nitrate ions.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(Total 5 marks)

Q8.

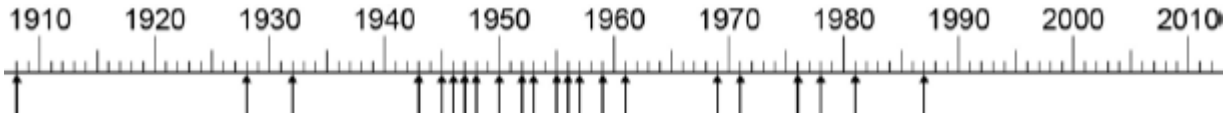
(a) Some antibiotics work by destroying the cell membranes of bacteria.

Suggest why these antibiotics may have side effects in the animals that are given these antibiotics.

_____

(1)

(b) Each arrow on the figure below shows the date of discovery of each new type of antibiotic.



In which 10 year period were most new types of antibiotic discovered?

_____

(1)

(c) The figure above shows 22 new types of antibiotic. These were discovered before 2010.

Determine the percentage of types of antibiotic that have been discovered between 1980 and 2010.

Use information from the figure above.

Give your answer to 2 significant figures.

_____

_____

_____ %

(2)

(d) Bacteria can evolve rapidly.

Many bacteria can develop into new strains which are resistant to antibiotics.

Complete the table below to show if each action is **more likely** or **less likely** to help bacteria to become antibiotic resistant.

Put a tick in each row.

Action	More likely	Less likely
Take painkillers for headache		
Washing with antiseptic hand gel		
Adding antibiotics to food for cows		
Giving antibiotics for colds and flu		
Stopping antibiotics as soon as you feel better		

(4)

(Total 8 marks)

Q1.

(a) transports water in the transpiration stream

1

(b) transports dissolved sugars using translocation

1

(c) 2/(0.1 × 0.1)
or
2/ 0.01

1

200

*an answer of 200 scores **2** marks*

1

(d) cooler around lower surface

1

more humid around lower surface

allow converse argument for upper surface of leaf if qualified

1

(so) less water evaporated

allow less breeze around lower surface

1

(e)

Level 3: Relevant points (correct processes / explanations) are identified, given in detail and linked logically to form a clear account.	5-6
Level 2: Relevant points (correct processes / explanations) are identified and there are attempts at logical thinking. The resulting account is not fully clear.	3-4
Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical thinking.	1-2
No relevant content	0
Indicative content • water is absorbed by osmosis • osmosis is a passive process, or described • water in soil is at a higher concentration than inside cell • water moves down concentration gradient	

• through a partially permeable membrane • phosphate ions absorbed by diffusion • diffusion is a passive process, or described • phosphate ions are in a higher concentration in soil than inside cells • magnesium ions are absorbed by active transport • magnesium ions are in lower concentration in soil than inside cells • magnesium ions move from an area of lower concentration to an area of higher concentration inside the cells • magnesium ions move up the concentration gradient • process requires energy • energy from respiration	

6

[13]

Q2.

(a) cell membrane

extra boxes ticked negates mark

1

(b) nucleus

extra boxes ticked negates mark

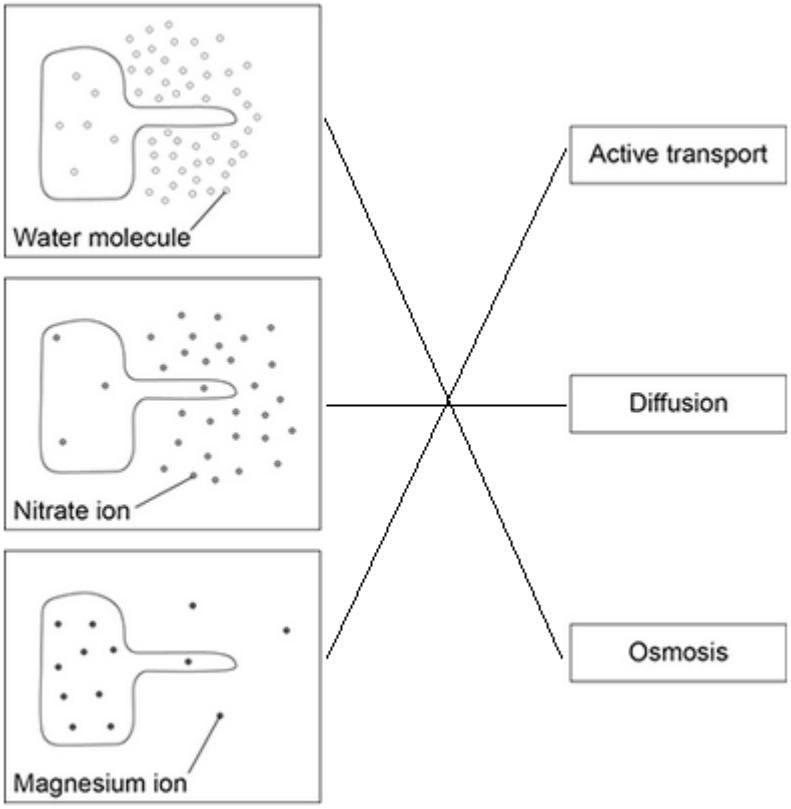
1

(c) has a tail so it can swim (to an egg)

accept has many mitochondria to release energy to swim

1

(d)



*all three correct for **2** marks*
*one or two correct for **1** mark*

2

[5]

Q3.

(a) 8 (micrometres)

1

(b) red blood cell(s)

1

white blood cell(s)

accept named cell
eg phagocyte / lymphocyte

1

(plasma)
transports proteins / dissolved substances / food (molecules) / urea / hormones / blood
cells

1

(c) any **one** from:

- you could lose a lot of blood
- bleed internally

allow bleeding would not stop
allow could bleed to death

1

[5]

Q4.

(a) mitosis

extra box ticked negates mark

1

(b) cell division is uncontrolled

extra box ticked negates mark

1

(c) any **one** from:

- smoking / tar
- alcohol
- carcinogens

  allow named chemical
- viruses (living in cells)
- (ionising) radiation

  accept UV / X-rays / gamma waves

1

(d) bar plotted at 78%

ignore width of bar

1

(e) testicular

extra box ticked negates mark

1

(f) prostate

extra box ticked negates mark

1

(g) any **two** from:

- improved treatment / drugs
- earlier diagnosis
- more cancer screening
- improved patient knowledge (of risk factors)

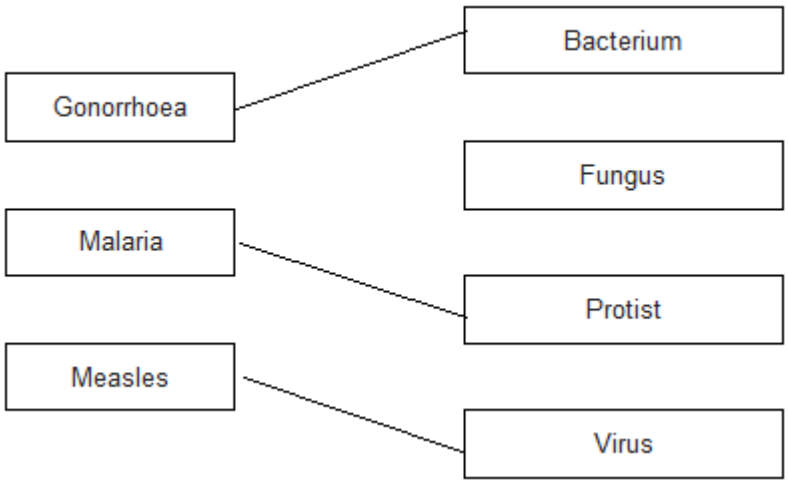
  allow improved patient diet / lifestyle

2

[8]

Q5.

(a)



3

(b) (trachea) has mucus

1

to trap pathogens

1

(trachea) has cilia

1

to move mucus out of trachea

1

(c) **dependent variable:**
number of times mosquitoes landed on socks

1

control variable:
any **one** from:

- number of mosquitoes in each container
- length of time socks worn
- dampness of socks
- same type of socks
- size of container
- time
- temperature
- species of mosquito
- age of mosquito

1

(d) use worn socks
or
use chemical from worn socks

1

to attract / trap infected mosquitoes

1

or accept:
wear clean socks / change socks regularly (1)
to reduce the chance of attracting mosquitoes (1)

(e) less chlorophyll present

1

(so) less light absorbed

1

(so) reduced photosynthesis
or
(so) less sugar / food made

1

[14]

Q6.

(a) **D**

1

any **one** from:

- has chloroplasts
- has a (large) vacuole
  ignore has a (cell) wall

1

(b) **B**

1

does **not** have a (cell) wall
*allow has <u>only</u> a nucleus, (cell) membrane **and** cytoplasm*

1

(c) **C**

1

any **one** from:

- genetic material is not in a nucleus
  allow no nucleus
- has a single loop of DNA

1

(d) real size = 25 / 100 000

1

0.00025

1

(conversion to) 0.25 (µm)
*allow 0.25 (µm) with no working shown for **3** marks*

1

[9]

Q7.

(nitrate) ions are absorbed by active transport

1

(active transport) is the movement of ions against the concentration gradient

allow (active transport) is the movement of ions from a dilute to a more concentrated solution

1

(active transport) requires energy from respiration

1

(respiration) requires oxygen

1

no / little oxygen / air in water-logged soil

1

[5]

Q8.

(a) animal cells also have cell membrane

1

(b) 1945–1955

allow 1946–1956

***or** 1947–1957*

1

(c) (2 / 22 =) $9.\dot{0}\dot{9}$

*allow 9.09 (%) or 9 (%) with no working shown for **1** mark*

1

9.1 (%)

*allow 9.1 (%) with no working shown for **2** marks*

1

(d)

More likely	Less likely
	✓
	✓
✓	
✓	
✓	

*allow **3** marks for 4 correct*

*allow **2** marks for 3 correct*

*allow **1** mark for 2 correct*

4

more than one tick in a row negates a mark

[8]