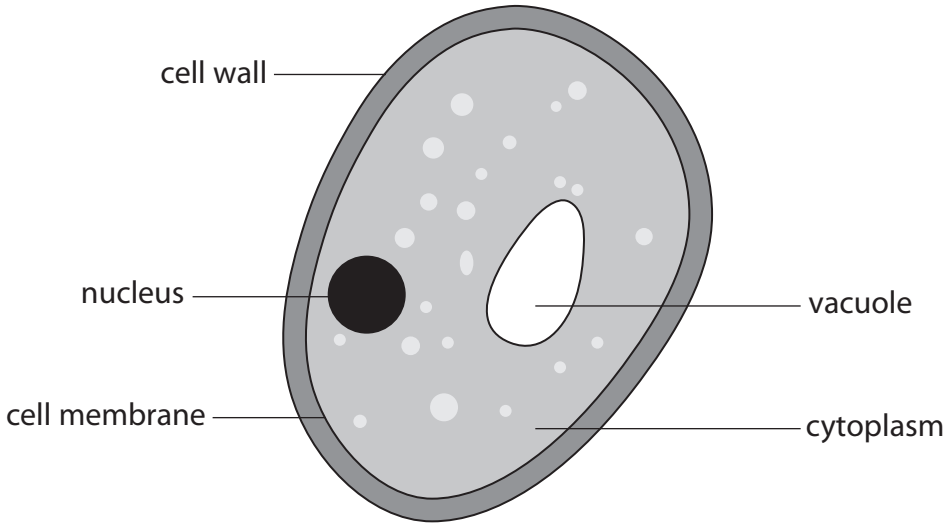
1 Yeasts are microorganisms that are used in the brewing and baking industries.

The diagram shows a yeast cell.



(a) (i) State **two** ways in which the structure of this yeast cell differs from the structure of a bacterial cell.

(2)

1 .....

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2 .....

.....

(ii) Plant cells can produce glucose.

Suggest why yeast cells cannot produce glucose.

(1)

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(b) The table shows the number of different components found in the blood of a healthy person and the blood of two other people.

	number of components per dm^3 of blood		
component of blood	**healthy person**	**person A**	**person B**
red blood cells	5×10^{12}	6×10^{12}	3×10^{12}
white blood cells	7×10^{9}	5×10^{10}	8×10^{10}
platelets	3×10^{11}	3×10^{11}	3×10^{11}

(i) Calculate the difference in the number of white blood cells per dm^3 of blood between the healthy person and person A.

(2)

answer = ...

(ii) Describe the functions of white blood cells.

(2)

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(iii) Person B has a low number of red blood cells compared to the healthy person.

Suggest an effect this may have on person B.

(1)

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.....

(Total for Question 1 = 8 marks)

2 Diffusion, active transport and osmosis can be used to move substances into and out of cells.

(a) A student was investigating osmosis in potato cubes.

He used the following method:

cut a potato into equal-sized cubes

- record the mass of each potato cube
- place each potato cube into different concentrations of salt solution
- remove the potato cubes after 30 minutes
- dry the potato cubes and record the final mass of each cube.

He plots his results on a graph shown in Figure 6.

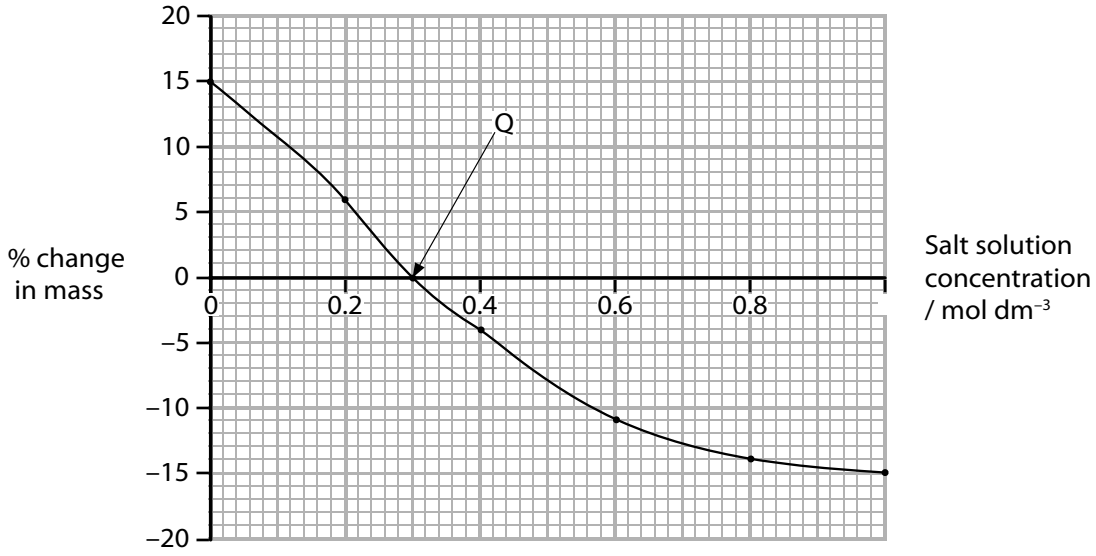

Figure 6

The method controls a number of variables.

(i) Name **one** other variable that needs to be controlled during the student's investigation.

(1)

.....

.....

(ii) Give a reason why the potato cube must be dried.

(1)

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.....

(iii) Explain the conclusion that can be made about point Q on Figure 6.

(2)

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(iv) Give one way that the student could obtain more data to increase the accuracy of point Q.

(1)

.....

.....

(b) Osmosis is one method that single-celled organisms, such as bacteria, use to obtain molecules from their environment.

Which of the following is a correct description of a process involving the transport of molecules?

(1)

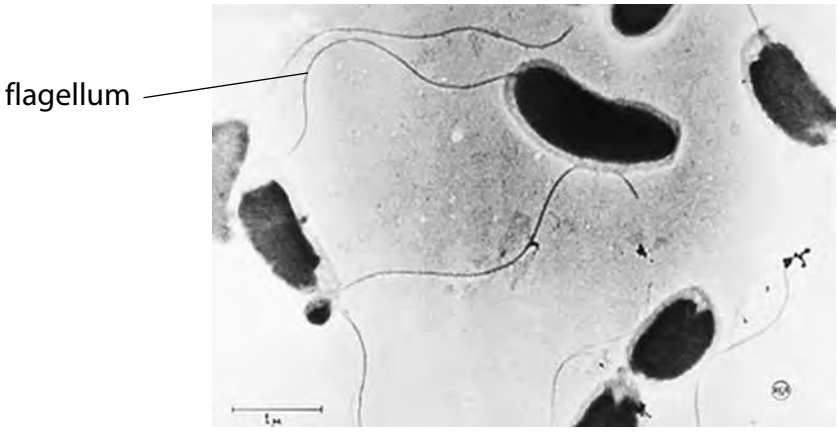
☒ **A** Diffusion is used to transport molecules against the concentration gradient

☒ **B** Active transport is used to obtain molecules in a low concentration environment

☒ **C** Active transport moves substances along the concentration gradient

☒ **D** Diffusion uses energy to transport molecules into cells

(c) Figure 7 shows some *Vibrio cholerae*, the bacteria that cause cholera.



Magnification ×8000

(Source: Corbis)

Figure 7

The length of one flagellum on Figure 7 is 68 mm.

Calculate the length of the flagellum in μm.

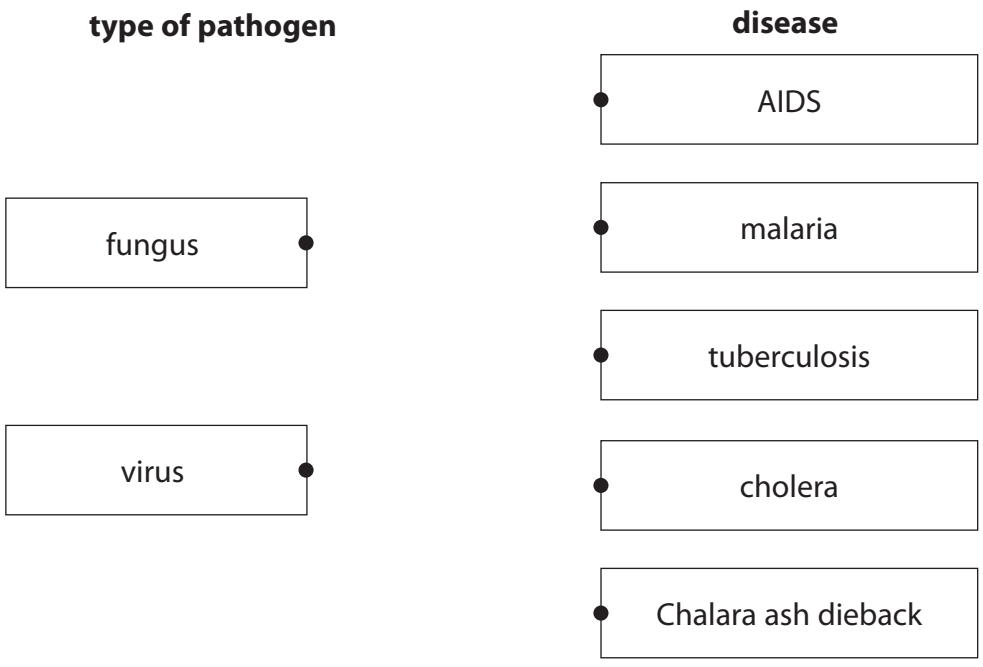
(3)

..... μm

(Total for Question 2 = 9 marks)

3 (a) Pathogens cause disease.

Draw one straight line from each type of pathogen to the disease that is caused by that pathogen.



(b) Antibiotics can be used to treat diseases.

Antibiotics kill

- ☒ **A** antibodies
- ☒ **B** antigens
- ☒ **C** bacteria
- ☒ **D** viruses

(c) Figure 1 shows the number of white blood cells in blood samples from three patients.

	Patient X	Patient Y	Patient Z
Number of white blood cells per µl	8 500	5 700	12 500

Figure 1

Explain why the data suggests that Patient Z has a bacterial infection.

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(d) HIV is diagnosed by blood tests.

State **two** safety precautions that need to be taken when handling blood samples.

1 .....

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2 .....

.....

4 Figure 2 shows part of a DNA molecule.

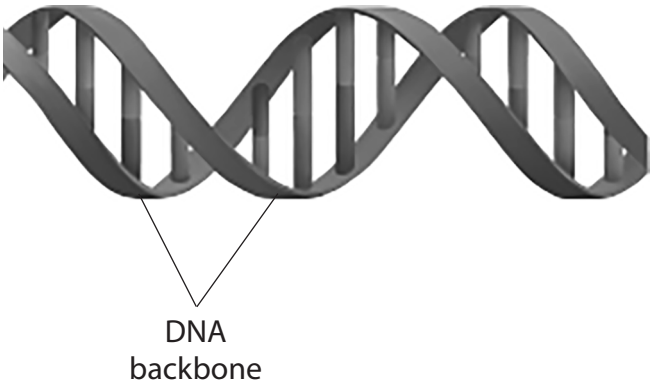

Figure 2

(a) (i) What is the shape of a DNA molecule?

(1)

☒ **A** single helix

☒ **B** double helix

☒ **C** complementary helix

☒ **D** triple helix

(ii) Which molecules are present in the DNA backbone?

(1)

☒ **A** sugars and phosphates

☒ **B** amino acids and bases

☒ **C** sugars and bases

☒ **D** amino acids and phosphates

(iii) State the type of bond that joins the bases together in the DNA molecule.

.....

(b) DNA can be extracted from fruit.

Describe how cells are broken down to release DNA.

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(c) In 2003, scientists finished sequencing the 3 billion base pairs in the human genome.

State **two** benefits that the Human Genome Project could have for medicine.

1 .....

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2 .....

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